THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
January 30, 1989 · Vol. XXIII · No. 4 · 130 Pages · $2/Copy · $44/Year

SPECIAL REPORT: NETWORK PIONEERS

COMPUTERWORLD

INSIDE

In Depth — Mini vendors broaden their horizons. Page 45.

Profile: From pressman to information wizard, Bill Dunn has steered information services into an elite position at Dow Jones. Page 55.

Aggressive pricing, upgrade options highlight VAX 6300 rollout. Page 8.

HP rides New Wave into major American Airlines contract. Page 6.

AT&T's unified network management system expected to be filled out with integrator products. Page 10.

Snazzy Dbase IV applications created by early users. Page 12.

Sears sets up technology subsidiary to integrate corporate DP and telecom activities. Page 2.

Residual values can make the difference when buying a CPU. Page 23.

Managing PC support. Weyerhaeuser's Stephens speaks out. Page 35.

Next week: Premier issue of *Computerworld Focus on Integration.*

IBM moves to demystify service options

BY ROSEMARY HAMILTON
CW STAFF

IBM launched its latest assault on the third-party maintenance market last week with the introduction of Serviceplan, a restructured service package that is intended to simplify maintenance administration, a key concern for MIS directors.

To sweeten the deal even more for users, IBM loaded the service package with new discounts and options that also reflect the maintenance-made-easy concept.

The company threw one other punch at competitors by announcing that it would increase the number of maintenance plans that remarketers can sell.

Highlights

- Contract documents consolidated from more than 25 to one.
- Estimated one-year fee based on number of systems to be maintained.
- Prepaying maintenance fees for three to five years gains an 18% to 30% discount.
- Less stringent Midrange Service Amendment available for high-end processors.

Competitors said last week that they were reviewing the move and will soon announce their responses. Sorbus, Inc., for instance, said it has been preparing a simplified standard contract that it will announce soon.

Meanwhile, users contacted last week applauded IBM's goal of making maintenance administration simple. But some also said they were not certain it could be put into practice easily.

One new option, for instance, would allow customers to establish an estimated bill for all equipment on a yearly basis. The total would be paid in monthly or quarterly installments. IBM touted this as a significant time-saver because users would no longer receive an itemized bill on every piece of equipment in their shop.

But James Johnson, data center director at Hallmark Cards, Inc. in Kansas City, Mo., said he was confused by this arrangement. "I'm not saying it's not a better idea, but someone here has to keep track of things," he said of the estimated billing. "I've thought about how to simplify things myself and I haven't come up with an answer. You still have to maintain records, and you have to check details."

Master contract

Serviceplan will be offered as a master contract to users. According to Thomas Esposito, a vice-president of marketing at IBM's National Service Division, the master contract eliminates most paperwork by calling for one customer signature. A user then selects other options or services from the master list and initials them, instead of plowing through paperwork for each option.

Ron Cipolla, corporate director of MIS at Kendall Co. in Boston, said he has been pushing for less paperwork for some time. "I

Continued on page 6

Portable Mac lack

BY JULIE PITTA
CW STAFF

CUPERTINO, Calif. — With user anticipation growing, Apple Computer, Inc. is struggling in its efforts to push its long-awaited portable Macintosh out the door.

A number of Apple's corporate customers have been briefed on the machine, but none of the half-dozen key Apple accounts contacted by *Computerworld* last week had received a working prototype of the Mac portable. Problems with the portable's screen and battery pack appear to be the culprits in the delay, sources said.

Some said they believe Apple will resolve its problems by summer; others said by fall. Apple Chairman John Sculley has promised a Mac portable before year's end. Apple officials declined to offer other specifics.

"We haven't been told a date

Continued on page 16

MIS STRATEGIES

No small change for Visa

BY PATRICIA KEEFE
CW STAFF

"Creeze."

Some 230 direct-connects to Visa U.S.A., Inc.'s credit card network brace themselves annually for that chilling command. But this is no stickup: It's just Visanet's yearly suspension of all changes affecting network stability during the lucrative holiday period between Nov. 1 and Jan. 15. That is when most merchants meet their profit goals, and it is Visa's job to make sure there are no electronic obstacles.

That 76-day period, a respite for Visanet, is hard-earned. Last year, prior to the interlude, it executed upgrades at 150 sites, or end points, while adding another 61 connections to meet "explosive growth" in both point-of-sale and electronic data capture services offered by Visanet, said Michael Massey, vice-president of Visa's Operations Center West.

Continued on page 84

ROBERT HOLMGREN

Waldo (left) and Massey *keep Visanet charging ahead*

Third parties shuffle feet on EISA plans

BY WILLIAM BRANDEL
CW STAFF

Personal computers equipped with the proposed Extended Industry Standard Architecture bus are expected to debut later this year, but users may have to search far and wide to find any add-in hardware to exploit the alternative architecture.

EISA, which is being promoted by Compaq Computer Corp. and a number of other vendors as an alternative to IBM's Micro Channel Architecture, has failed to garner much support from the industry's leading board makers. Calls to almost a dozen of the leading add-in hardware vendors last week found that only EISA cofounder AST Research, Inc. in Irvine, Calif., has any concrete development plans to exploit the bus' reported potential.

The survey comes on the

Continued on page 85

NEWSPAPER

#63[illegible] 5-DIGIT 48106
#UIV7ZE38#M39068# 0018118408

UNIVERSITY MICROFILMS INT 349
UNIVERSITY MICROFILMS INT
SERIAL PUBLICATIONS
300 N ZEEB RD
ANN ARBOR MI 48106

SECOND CLASS MAIL

IN THIS ISSUE

System supplanting. High-powered DEC 6300 VAX models succeed flourishing 6200s, spell doom for unpopular high-end 8800s. Page 8.

Supra slants. Cincom introduces SQL-based relational DBMS version pitched toward IBM, DEC and Unix operating platforms. Page 85.

NEWS

4 Newest Lawrence Livermore storage system already a tight fit.

4 DEC releases incomplete audit results of benchmark tests.

6 Hewlett-Packard lands American Airlines' office automation contract.

8 DEC mollifies 6200 users with 6300 upgrade incentives.

8 Amdahl chalks up a hearty fourth quarter; AT&T falters.

10 AT&T integrator rollouts fill holes in UNMA system.

10 Travelers suffers MIS personnel losses.

12 Users are managing to crank out slicker, quicker applications with Dbase IV.

16 Judge halts Reagan Profs purge pending decision on archive group's suit.

17 X/Open pledges user interface definition for 1989.

17 International telecom firms plot economical digital service.

84 Chaos necessitates motivation for Visanet's MIS staff.

85 Microsoft intends to support Micro Channel and EISA bus with one OS/2 version.

85 Comnet to host unveiling of first FDDI connection for IBM mainframes.

SYSTEMS & SOFTWARE

23 How to deduce a system's potential residual value.

23 DEC concedes desktop software's hearty memory appetite.

MICROCOMPUTING

33 Are the Macintosh price cuts too little, too late?

33 Third-party Mac II developers congregate at Macworld.

Mini makers take wing for new niches. Page 45.

NETWORKING

39 Novell drivers patch up IBM Token-Ring bridge relations.

39 Delta Air Lines overhauls backbone with packet-switched technology.

39 The ICA condemns local carriers' deregulation notions.

39 Users of ISDN still yearn for PC applications.

MANAGEMENT

55 Dow Jones VP may work himself out of a job — and into the chairmanship.

55 Successful IS candidates need the personal touch these days.

COMPUTER INDUSTRY

61 Firms that gratified users reaped rewards last quarter.

61 Prime workers rally 'round their flag.

61 Canadian companies cheer free trade accord.

Quotable

"The negotiating and reading and understanding you have to do is a drain. I say, let's sign one agreement that says I'm your customer and you're my supplier."

RON CIPOLLA
KENDALL

On IBM's revised service plan. See story page 1.

COMPUTER CAREERS

66 Service-minded firms are breeding grounds for business analysts.

TRAINING

81 CASE work warrants careful conditioning.

TRENDS

86 The more users hear about OS/2, the less they want to implement it.

SPECIAL REPORT

Companies that bet on untested networking methods find the payoffs worth the struggle.
Follows page 44.

IN DEPTH

45 The stand-alone minicomputer gets some company. By Helen Pike.

OPINION & ANALYSIS

19 Tasker analyzes IBM's two-tier architecture strategy.

21 Barnes distinguishes modeling from simulation and when to do which.

23 Gibson finds fault with Oracle ad, DEC audit.

33 Alexander highlights points in business opus.

39 Horwitt exhorts ISDN Users Forum to get down to brass tacks.

55 Gilliam demonstrates how MIS chiefs can please senior management.

61 Wilder casts industry reflections in his last section column.

DEPARTMENTS

6 News Shorts
20 Editorial
60 Calendar
75 Marketplace
83 Stocks
86 Inside Lines

Scratch and spit

Latest sideswipes in the Prime, MAI cat fight

BY NELL MARGOLIS
CW STAFF

Prime Computer, Inc. and would-be buyer MAI Basic Four, Inc. exchanged paper blows last week as MAI's hostile takeover attempt, entering its third month, appears to be evolving from a preposterous escapade into a war of attrition.

In addition to firing off a letter to Prime Chairman David Dunn and Chief Executive Officer Anthony Craig charging Prime with dereliction of duty to its stockholders, MAI moved on several legal fronts to further its position.

As ordered by U.S. District Judge A. David Mazzone, the company filed additional disclosures concerning the financing of its proposed offer, which showed designated bidder and key financing source Drexel Burnham Lambert, Inc. possibly earning $55 million if MAI wins out. MAI also petitioned the federal court in Massachusetts to lift the preliminary injunction it had issued pending further disclosure.

Earlier in the week, MAI petitioned the Delaware Chancery Court to hear a renewed motion to quash Prime's poison-pill provisions. MAI's original motion was denied last month; however, since that time, approximately 71% of Prime's outstanding shares have been tendered to MAI, a circumstance that MAI hopes will sit favorably with the court.

Prime parried this thrust with an official statement calling its spurned suitor's additional disclosures insufficient on several grounds and asserting its intention to fight MAI's efforts to overturn the federal court's injunction. The company then whipped off a succinct "No deal" reply to MAI Chairman Bennett LeBow.

"What you're seeing here is a very, very well-staged high-stakes psychological game of 'gotcha — you blinked,' " said Charles Varga Jr., a principal at Cerberus Group, Inc., a merger consultant and market research firm based in Frenchtown, N.J. Can MAI win by simply outwaiting Prime? Possibly, Varga said, if enough shareholders blink.

Sears inaugurates DP/telecom subunit

BY ALAN J. RYAN
CW STAFF

CHICAGO — Sears, Roebuck and Co. last week announced the formation of a subsidiary charged with integrating the data processing and telecommunications activities of the corporation.

Sears Technology Services, Inc. will be headed up by group President Charles A. Carlson, formerly vice-president of information services at the Sears Merchandise Group. He will direct operations of Sears Technology Services, which will include Sears' communications network, according to a company spokesman.

Sears' Carlson

Carlson, 55, will report to Charles F. Moran, senior vice-president and chief information officer.

Robert J. Ferkenhoff, who formerly held the position of vice-president of information systems at Sears Canada, Inc., will assume Carlson's former duties.

Carlson, a graduate of the College of St. Thomas in St. Paul, Minn., has been employed by Sears since 1969. Ferkenhoff, 46, is a graduate of St. Benedict's College in Atchinson, Kan., and has been with Sears since 1964.

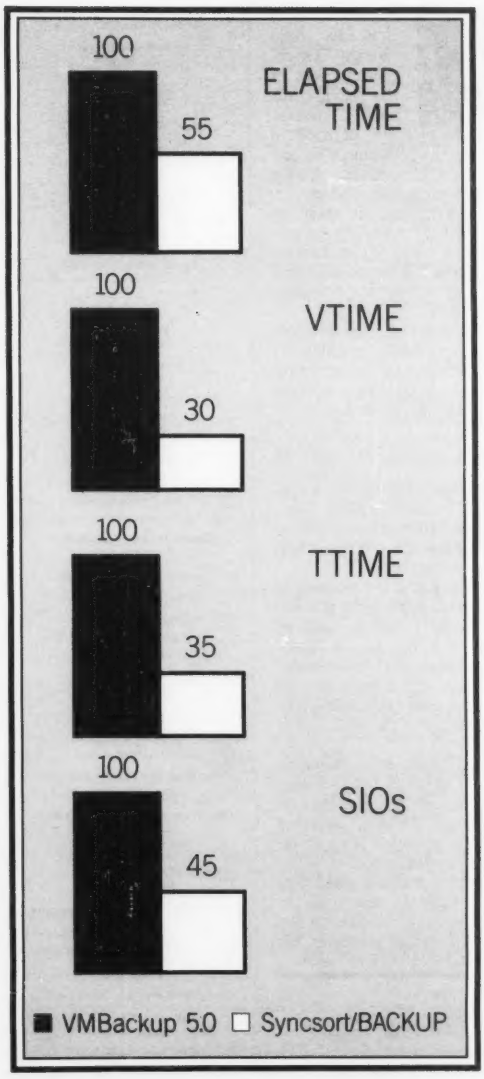
According to a Sears spokesman, the Sears Technology Services group will service the needs of the corporation's member companies, one of which is the merchandise group that serves the retail stores and catalog centers.

Sears recently announced plans for a new telecatalog center in Johnson City, Tenn., which it said completes its nationwide network designed to improve service for customers who shop through the Sears catalog. The center will open in June.

Sears formerly processed its phone-in catalog orders in various retail locations but has now shifted its focus to the nine telecatalog centers. The centers allow closer monitoring of warehouse operations, replenishing of inventories, reserving of merchandise and improved customer service, a spokeswoman said.

VM USERS

Only Syncsort/BACKUP meets your needs!



1. PERFORMANCE

Your users want their files restored. . . **fast.** Operations wants the production backups done. . . **fast.** And if you ever have a disaster, the only thing that will matter is: how **fast** can the system be restored!

Only Syncsort/BACKUP gives you. . . . **FAST.** Plus, it's resource efficient! It will provide you up to:

- 45% reduction in Elapsed Time.
- 65% savings in CPU (TTIME, VTIME) Time.
- 55% reduction in SIOs.

2. RECOVERABILITY

Production backup jobs shouldn't abend when they hit a bad tape or the operator can't find the next tape volume to mount. If the software you are using can't protect itself against media and system failures, how will it protect your data?

Only Syncsort/BACKUP gives you:

- Inflight recovery from permanent tape/disk errors.
- Checkpoint/Restart facility.
- Task Audit Log.

3. FUNCTIONALITY

If you buy a Backup/Restore solution, you should get what you need to solve the problem. . . not a song and dance about needing "other" products to perform key basic functions.

Syncsort/BACKUP is the self-contained solution that includes:

- Full-Screen Front End for easy operation.
- Directory Extract Facility for dynamic job creation.
- Event Scheduler for automated operation.
- Tape Pool Manager for intelligent media management.

Find out how Syncsort/BACKUP can meet your VM needs. Complete and send the attached coupon. Even better, give us a call at (201) 930-8200.

Yes. I want to find out more about Syncsort/BACKUP for my VM environment. Please:

☐ Contact me to set up a meeting.

☐ Send more detailed information.

Send to:
Syncsort Incorporated
50 Tice Boulevard, Dept. VMC
Woodcliff Lake, NJ 07675

Name _____ *Phone* _____

Title _____

Company _____

Address _____

_____

City _____ *State* _____ *Zip* _____

syncsort INC.

WHERE PERFORMANCE IS THE ISSUE.

© 1988 Syncsort Incorporated, 50 Tice Boulevard, Woodcliff Lake, NJ 07675.

Livermore revamps tape library

BY J. A. SAVAGE
CW STAFF

LIVERMORE, Calif. — Nuclear weapons researchers at the University of California's Lawrence Livermore National Laboratory have more than two decades' worth of data in storage, and with each supercomputer added to help crunch numbers, storage needs expand exponentially.

Last week, the lab unveiled its latest mass storage device, which is already oversubscribed and predicted to be inadequate by 50% when a new $25 million Cray Research, Inc. YMP supercomputer arrives next month.

The mass storage system consists of five Storage Technology Corp. 4400 Automatic Cartridge Libraries and replaces an 8-year-old reel tape library from a defunct company. "[Our old system has] been very unreliable," storage group leader Sam Coleman said. "In fact, a repairman left about half an hour ago."

Livermore has owned four mass storage devices since 1966, according to Coleman, and each has been advanced for its time. But the profusion of weapons data is swamping the facility.

"Now we write in one month what took seven years" to write a decade ago, said John Ranelletti, deputy director of the computer department. "We need a Seymour Cray of storage."

The lab generates one trillion bytes of storage per year, which is expected to double with the YMP. "To store one memory dump from [the YMP] will almost equal what we currently store in an entire day, and users would like to do this every few minutes," Coleman said.

The major obstacle in buying the new mass storage libraries was not the cost, because at $1.75 million for five libraries, the lab received a significant discount from Storage Tek's list price of $500,000. Nor was it the access time, which Coleman said "is not significantly better" at 30 seconds than the tape system being replaced. Instead, the major obstacle was the operating system. The lab needed a Unix operating system, and Storage Tek offers only IBM's MVS.

Nearly 15,000 lines of code were needed to integrate the mass storage system. While Coleman and Ranelletti said there were no problems bringing the system up after customizing the operating system, John Kordas, the laboratory's computer scientist responsible for the code, said that in the last two months he eliminated "plenty" of bugs, such as robotic arms smashing tapes together in the middle of the night.

MARVIN COLLINS

Lawrence Livermore's *Coleman tries to meet needs*

Kordas said Storage Tek received a copy of the lab's Unix code. Storage Tek declined to comment on any potential offering of Unix-run storage devices.

Despite using the easily accessed Unix operating system, the lab is trying to keep hackers from classified documents by restricting access to the storage controllers.

Coleman said someone would have to physically break into one of 12 offices at the heavily guarded site and tap into a terminal with direct access to the controllers.

DEC releases audited benchmark results

BY STANLEY GIBSON
CW STAFF

Six months after proclaiming superior price/performance in transaction processing, Digital Equipment Corp. emerged with some audited Debit/Credit benchmark reports last week.

DEC unveiled audited figures for the 6300 series as well as audited results for the Microvax 3600 and 6200 series. DEC had previously released performance figures for those systems, but not an audited report.

The audited results for those systems are generally in line with earlier figures. However, the remainder of last summer's results, including those for IBM systems, are still unaudited. Last week, DEC promised that complete audited reports would be forthcoming for all tests. DEC said last summer that the report would be issued in October 1988. However, DEC's auditor, Peat Marwick Main & Co. reportedly did not agree to any audits until December 1988. DEC said it is rerunning all of last year's tests for the auditor.

In addition, DEC also released an unaudited report for its VAX 8800 series that contained discrepancies, which some analysts called significant.

In its audit, Peat Marwick certified that the results conformed to Debit/Credit test procedures. The firm said it did not observe the VAX 6310 results, although it did observe the tests conducted on the 6320, 6340 and 6360 systems. All systems were tested under DEC's ACMS teleprocessing monitor in conjunction with its RDB relational database. DEC said tests under its Decintact teleprocessing monitor would be forthcoming.

In the 8800 results released by DEC, there were several differences in the tested and priced configurations. Notable among them was that DEC tested a system configured with 256M bytes of memory but priced a system with only 128M bytes.

DEC explained that, in the 256M-byte configuration, the 8810 used 30% of the memory; the 8820 used "less than half" the memory; and the 8830 system used 56.8% of the memory. In the 8830, DEC said, by reducing "specific VMS and VAX ACMS parameters," the memory can be reduced to 128M bytes. However, DEC did not perform this reduction.

A DEC spokesman would not comment on the reason for the difference, but said the firm would rely on Peat Marwick to determine whether or not the test is valid.

Frederic Withington, an independent consultant in New York, concurred that the different memory configurations could affect performance in all 8800 systems. "The way the memory is used could mean there may be more throughput when more memory is configured," he said.

Dale Kutnick, managing director of Meta Group, Inc., a consulting firm in Redding, Conn., agreed: "The I/O throughput starts bogging down in the 8800 when you get over the 8820, so they played games with the memory configuration."

However, Peter Burris, an analyst at market research firm International Data Corp. in Framingham, Mass., suggested that the Debit/Credit benchmark could be constructed in such a way that the memory difference would not be significant.

Omri Serlin, president of Itom International, Inc., a consulting firm in Los Altos, Calif., said the 8800 results are not important because very few people are ordering the 8800.

Kutnick said the slowness of the 8800 in transaction processing means it will be replaced soon with the much-rumored Aridus processor, an air-cooled follow-on with a larger internal bus of at least 100M bytes. The internal bus of the 8800 is only 70M bytes.

Last spring, at the announcement of the 8800, DEC's William R. Demmer, vice-president of mid-range systems, indicated that the line would likely be replaced in a year or so.

Several analysts noted that the benchmark report on the 6200 were released only a few days before that processor was superseded by the 6300 series.

Tuning up

DEC benchmarks using the ACMS transaction processing monitor and RDB/VMS database indicate clear advantages for 6300 models

CPU model	Memory (in bytes)	Transaction/sec.	Five-year cost per transaction/sec. (in thousands)
3699	32M	5.7	$39
6310	64M	8.4	$64
6320	64M	16	$49
6340	128M	25.4	$47
6360	192M	30	$62
8810*	128M	12	$95
8820*	128M	20.8	$70
8830*	128M	27.5	$66

* Not audited

SOURCE: DIGITAL EQUIPMENT CORP.
CW CHART: FRANK C. O'CONNELL

COMPUTERWORLD

Editor in Chief
Bill Laberis
Executive Editor
Paul Gillin

News Editor
Peter Bartolik

Assistant News Editor
James Connolly

Senior Editors
Clinton Wilder, Industry
Elisabeth Horwitt, Networking
Patricia Keefe, Networking
Douglas Barney, Microcomputing
Stanley Gibson, Software
Michael Alexander, Microcomputing
Rosemary Hamilton, Systems

Senior Writers
Nell Margolis
Alan J. Ryan
Amy Cortese
William Brandel

Staff Writer
James Daly

New Products Writer
Sally Cusack

Features Editor
George Harrar

Senior Editors
Glenn Rifkin
Joanne Kelleher, Spotlight and Executive Report
Michael L. Sullivan-Trainor, Special Projects

Senior Writer
David A. Ludlum

Associate Editors
Deborah Fickling
Kelly Shea

Assistant Editor
Sharon Baker

Researchers
Bonnie MacKeil
Kevin Burden

Chief Copy Editor
Mary Grover

Assistant Chief Copy Editor
Donald St. John

Features Copy Editors
Julie L. Cook
Joseph J. Fatton

Copy Editors
Cathleen A. Duffy
Richard R. Pastore
Joyce Chutchian

Art Director
Nancy Kowal

Graphics Specialists
Frank C. O'Connell
John B. York

Graphics Researcher
Laura O'Connell

Assistant to the Editor in Chief
Linda Gorgone
Editorial Assistants
Patricia Faherty
Lorraine Witzell
Megan Santosus

Rights and Permissions Manager
Sharon Bryant

News Bureaus
Mid-Atlantic
201/967-1350
Robert Moran, Correspondent

Washington, D.C.
202/347-6718
Mitch Betts, Bureau Chief

West Coast
415/347-0555
Jean Bozman, Bureau Chief
Julie Pitta, Senior Correspondent
J.A. Savage, Correspondent
Patrick Waurzyniak, Correspondent
Mary Elliston, Editorial Assistant

IDG News Service
Kathleen A. Gow, Director

Main Editorial Office
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171
508/879-0700

All Fire. No Smoke. ORACLE® Version 6.

"ORACLE Version 6 gives us up to six times faster throughput."

Jerry Goersch, Vice President of R&D
International Financial Systems, Ltd.

ORACLE Version 6 Performance
- 265 tps on MVS
- 124 tps on UNIX
- 49 tps on VAX/VMS

"Our early benchmarks of ORACLE Version 6 show a five-fold increase in systems throughput for multiple users."

David Hart, Executive Director for Computing
University of Houston-Clear Lake

"We use ORACLE to run our company. The real application performance of ORACLE Version 6 on our advanced parallel-processing architecture is at least as good as the benchmark improvements would indicate."

Casey Powell, Chairman and CEO
Sequent Computer Systems, Inc.

When we launched ORACLE® Version 6 with the transaction processing option, we surprised everybody with our benchmark results. ORACLE set world records on all major platforms — mainframes, minicomputers and UNIX-based workstations. And now, our customers are finding even more dramatic performance increases in their *real-world* applications.

Our benchmarks have received a good deal of attention. But the real performance test is in the real world with your applications. We invite you to experience for yourself ORACLE Version 6, the world's fastest DBMS.

To register for the next free seminar in your area, call 800-345-DBMS, extension 8120. Or write for our complete benchmark kit. ORACLE Version 6 is *all* fire.

ORACLE®

COMPATIBILITY • PORTABILITY • CONNECTABILITY

Call 1-800-345-DBMS, ext. 8120 today.

Copyright © 1988 by Oracle Corporation. ORACLE is a registered trademark of Oracle Corporation. Other companies mentioned own numerous trademarks/registered trademarks. TRBA

20 Davis Drive, Belmont, CA 94002 • World Headquarters (415) 598-8000 • ORACLE Canada (800) 387-4407 (except Quebec) • Quebec (514) 337-0755 • ORACLE Systems Australia 61-2-959-9080 • ORACLE Europe 44-1-940-6811 • ORACLE Systems Hong Kong 852-5-268848

U.S. SEMINAR SCHEDULE

AK	Anchorage	Feb 6*af*
AL	Birmingham	Jan 11*c*
	Huntsville	Feb 7*g*
	Montgomery	Feb 23
AZ	Phoenix	Feb 7*cfm*
	Scottsdale	Jan 12*r*
	Tucson	Feb 14
CA	Costa Mesa	Jan 24*cfm* Feb 23*ar*
	La Jolla	Feb 9*am*
	Los Angeles	Jan 19*fm* Feb 16*acr*
	Ontario	Jan 10
	Oxnard	Feb 2*fm*
	Sacramento	Jan 17*r*
	San Diego	Jan 17*fr*
	San Francisco	Jan 24*fr* Feb 15*apr*
	Santa Clara	Jan 12*fm* Feb 9*at*
CO	Colorado Springs	Feb 22*r*
	Englewood	Jan 31*fm*
CT	New Haven	Jan 11*ap*
DC	Washington	Jan 18*g* Feb 16*g*
FL	Boca Raton	Feb 7*fm*
	Jacksonville	Jan 19*fr*
	Miami	Jan 17*fr*
	Orlando	Jan 18*p* Feb 9*g*
	Pensacola	Feb 22
GA	Atlanta	Jan 17*f*
	Savannah	Feb 16*p*
IA	Des Moines	Jan 17*f*
IL	Chicago	Jan 25*ft* Feb 22*a** Feb 28*fm*
	Springfield	Feb 14*c*
IN	Indianapolis	Jan 31*fr* Feb 21*ac*
KS	Wichita	Feb 16*t*
KY	Lexington	Jan 24
	Louisville	Feb 7*r*
LA	New Orleans	Jan 27*f*
	Shreveport	Feb 16*r*
MA	Boston	Jan 17*fr*
	Springfield	Jan 19*t*
	Worcester	Feb 8
MD	Baltimore	Jan 24*m* Feb 7*t*
MI	Dearborn	Feb 7*ft*
	Grand Rapids	Jan 12*f*
	Lansing	Feb 14*fp*
	Troy	Jan 10*c*
MN	Minneapolis	Jan 11*ft* Feb 15*cr*
MO	Kansas City	Jan 26*f*
	St. Louis	Jan 12*f* Feb 9*t*
NC	Charlotte	Jan 25
	Greensboro	Feb 15*r*
	Raleigh	Jan 10*fr*
NE	Omaha	Jan 4*c*
NH	Merrimack	Jan 12
NJ	Iselin	Jan 10*ar* Feb 15*fr*
	Princeton	Jan 18*f* Feb 15*t*
	Secaucus	Jan 26*f*
NY	Albany	Jan 18*t*
	East Syracuse	Jan 10*at*
	Fairport	Feb 9*fr*
	Melville	Jan 18*f* Feb 15*r*
	New York City	Jan 11*r* Jan 25*f* Feb 7*ar* Feb 22*f*
OH	Akron	Feb 1*f*
	Beachwood	Jan 10*c*
	Cincinnati	Jan 26*f*
	Columbus	Jan 12*f*
OK	Oklahoma City	Feb 8*fm*
	Tulsa	Jan 24*fp*
PA	Harrisburg	Feb 9
	King of Prussia	Jan 27*t*
	Philadelphia	Jan 23*g* Feb 6*ft*
	Pittsburgh	Jan 18*fm*
	Scranton	Feb 15*p*
RI	Providence	Feb 2*f*
SC	Greenville	Feb 8*f*
TN	Knoxville	Feb 8*r*
	Memphis	Feb 16*c*
	Nashville	Jan 12*c*
TX	Austin	Jan 19*f*
	Dallas	Jan 10*fp* Feb 1*fr*
	Houston	Jan 12*ft* Feb 9*ft* Feb 14*g*
	San Antonio	Jan 20*f*
UT	Salt Lake City	Feb 1*f*
VA	Richmond	Jan 11*f* Feb 22*c*
	Roanoke	Feb 2
WA	Seattle	Jan 5*fm* Feb 21*fr*
WI	Madison	Feb 22*f*
	Milwaukee	Jan 26*fr*

For Canadian Seminars

Call (800) 387-4407, except in Quebec, call (514) 337-0755.

The following key indicates additional afternoon seminars that are offered with these seminar dates:

a Integrating MacIntosh into Corporate Network
c CASE Tools
f Oracle Financials
m Computer Integrated Manufacturing (CIM)
p PC Workgroup Solutions
r SQL*Reportwriter
t ORACLE Transaction Processing
v Value Added Relicensors (VARs)

Please note:

g These seminars are directed to the Federal Government only
* Only the indicated afternoon seminar is held on these dates

Attn.: National Seminar Coordinator
Oracle Corporation • 20 Davis Drive
Belmont, California 94002

1-800-345-DBMS, ext. 8120

☐ My business card or letterhead is attached. Please enroll me in the *FREE* ORACLE seminar to be held

at: _____

on: _____

COMPUTERWORLD

NEWS SHORTS

Trouble in paradise

Apple Computer, Inc., which saw its once-booming profit growth slow in the December quarter, had much worse news last week: Its March quarter earnings will drop some 35% below 1988 levels. Apple blamed the expected drop on the micro industry's familiar refrain — high memory chip prices forced systems price increases, and Apple customers were scared off. Apple Chairman John Sculley said buyers shifted to lower priced, lower margin configurations of the Macintosh SE and Macintosh II. Apple cut prices on Jan. 17 to stimulate high-end demand; those price cuts will result in lower profits for the Cupertino, Calif., company.

GSA rejects Honeywell appeal

The U.S. General Services Administration last week denied Honeywell, Inc.'s protest of the U.S. Air Force Unix minicomputer contract known as AFCAC-251. The GSA's Board of Contract Appeals rejected the Honeywell Federal Systems Group's claim that the Air Force was biased toward AT&T, which won the $929 million contract for 21,000 Unix minicomputers [CW, Nov. 7]. The GSA ruling ends the appeal process and frees the Air Force and AT&T to proceed with the contract.

Worldwide cuts at Nixdorf

West Germany's Nixdorf Computer AG has said that it could eliminate as many as 1,600 jobs through attrition — or almost 19% of its work force — by the end of the year. A hiring freeze coupled with the subsequent departures among Nixdorf's 30,450 workers could save the company as much as $40 million, analysts said. "They've planned for more growth than the market is giving them," said Horacio Valeiras, European electronics analyst at First Boston Corp. market research house. "They've had some rough times and would like to get back to pre-1987 levels." Research, sales, production and administrative jobs would most likely be hit hardest, according to analysts.

Western Union's multivendor ties

Western Union Corp. last week announced an integrated facsimile, electronic mail, telex and mailgram package designed to link diverse office systems with Western Union's worldwide E-mail network. Office Access is available now for systems running Wang Laboratories, Inc.'s Wang Office. It is slated to be available for Digital Equipment Corp. VAXs in March and for the IBM Personal Computer and Personal System/2 family in April.

Micropro wins in court

A California judge ruled in favor of Micropro International Corp. last week in a challenge to Micropro's ownership of the Wordmaster text editor software. The suit, filed in 1988 by the former Imsai Manufacturing Corp., had charged San Rafael, Calif.-based Micropro and two former Imsai employees with misappropriating Imsai's software text editor, Ned, after Imsai declared bankruptcy in 1979. Imsai, founded by William Millard, was a hardware and software vendor based in Hayward, Calif. The bankruptcy case was reopened for the purpose of the suit. In its ruling last week, the court found that the statutes of limitations had expired.

Bell Atlantic loses

U.S. District Judge Harold H. Greene last week rejected Bell Atlantic Corp.'s request to use a single computer to provide Pennsylvania customers with a gateway for information services. Greene said the plan violates the court ban on Bell operating companies providing long-distance services, because traffic could possibly cross several local access and transport areas (LATA). Bell Atlantic will be required to install a computer in each of the state's five LATAs to comply with the ban on inter-LATA traffic, which the company argued will drive up consumer costs.

American Air lands HP for OA deal

BY J. A. SAVAGE
CW STAFF

DALLAS — Replacing an office system based largely on interoffice manila envelopes and cryptic phone messages, American Airlines, Inc. last week announced its choice of Hewlett-Packard Co. for an $18 million office automation project.

While the deal will be the largest implementation of HP's fledgling object-oriented New Wave software, New Wave was not part of the original bid. "It was icing on the cake," said Wayne Pendleton, American's managing director of the automation project.

Office systems for American, the nation's largest airline, have been largely typewriter- and copy machine-based, with "small pockets" of stand-alone personal computers, according to Pendleton.

HP 3000s act as servers

Included in the deal are a minimum of 135 HP 3000 minicomputers — running the company's proprietary MPE operating system — that will act as file servers for as-yet-unchosen PCs for 15,000 of the airline's 67,000 employees. According to Bob Frankenberg, general manager of HP's Information Systems Group, the MPE operating system was chosen because HP's newer Unix system has no X.25 or native IBM communications capability.

Electronic mail and resource software will be added as well as networking to the airline's IBM mainframe-based reservation system. Peripherals and support are also included in the deal.

American has called this the Interaact project, and company officials said they believe it will be the largest corporate information system of its kind outside the computer industry.

Reservation personnel will be able to tap into the E-mail features, and office personnel will be able to access the reservation system for spreadsheet-type information, according to Pendleton.

HP beat out IBM, Digital Equipment Corp. and Wang Laboratories, Inc. for the contract. HP's offer was the low bid, but American would not specify how low.

IBM

FROM PAGE 1

sign an agreement with the IBM reps, with the branch office, with the professional services people and on and on. The negotiating and reading and understanding you have to do is a drain. It's a pain, it really is. I say let's sign one agreement that says I'm your customer and you're my supplier."

Other options

While users shuffle less paper, there are also a number of new options under Serviceplan. In addition to the estimated billing, IBM announced the following:

- Discounts ranging from 18% to 30% will be offered on new equipment maintenance if a user pays the total up front for a three-, four- or five-year contract. Combined with other discount plans, that discount could reach 50%. IBM had announced this plan for the Application System/400 but is extending it to other processors; it will now be called the Extended Maintenance Option.

Customers can lock in at a certain price for a set number of years and not have to renegotiate. But one user, noting the long-term commitment and up-front costs, said he is not interested in this deal "just looking at the economics of it."

- IBM has simplified personal computer and terminal coverage with its Corporate Service Amendment (CSA), its offering for large shops that gives discounts averaging 25% if users perform several maintenance requirements. Locally attached PCs and terminals, which previously had required a separate option to CSA, will now be part of CSA coverage and get the same discount.
- High-end processor users now have the option of selecting the Midrange Service Amendment (MRSA), whereas previously they were limited to CSA to obtain discounts. MRSA is similar in concept to CSA, but it gives users less of a discount — averaging around 15% — because users have fewer maintenance requirements to fulfill. This option, IBM said, is aimed at users currently under MRSA who are upgrading to bigger processors and do not want the hassle of the CSA requirements.
- With Serviceplan, IBM eliminated the requirement of having either a Rolm Systems CBX or an IBM processor to participate in its Telecommunications Services Network Support plan. This has also been renamed Network Support. This option is aimed at multisite customers that may have remote facilities without an IBM computer or Rolm CBX.

One way IBM hopes to peddle these options successfully is through the Remarketers End-User Serviceplan. It said last week that authorized resellers, which had previously been able to resell CSA, can now sell its mid-range counterpart, MRSA, as well as the Extended Maintenance Option.

According to Esposito, IBM plans a big push to open reseller channels. He said IBM launched the CSA reseller effort in mid-1988, but "we didn't do a good job of merchandising it, so we didn't get the coverage we were looking for."

If successful, it will be another thorn in the side of third-party providers, some of which are already feeling squeezed because of IBM's earlier competitive moves in this market.

Third-party concern

"There's a lot of concern, and we've been struggling with it," said Jerry Ritter, Sorbus' product manager for IBM minicomputer and mainframe systems. Ritter said Sorbus pointed to IBM's aggressiveness late last year when it announced a layoff, which he said was a onetime competitive action to fight IBM.

While there will be no price cuts to respond to IBM's latest move, he said Sorbus will be releasing simplification plans to parallel last week's announcement.

Meanwhile, Control Data Corp. is standing firm with its claim that IBM's announcement does not offer any "significantly increased value other than the simplified billing," according to a spokesman.

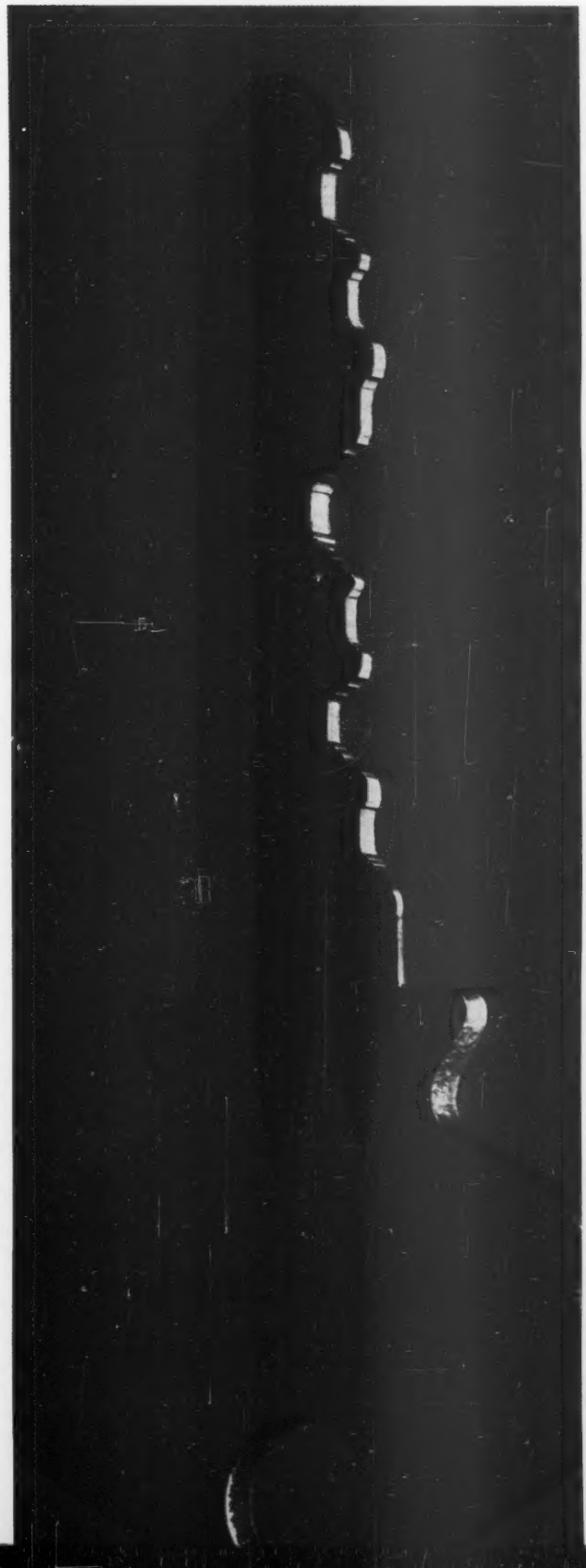
PS/2 storage monitor out

IBM last week rolled out Service Director, a Personal System/2 Model 80 bundled with proprietary software that monitors storage-system performance. The system works with the IBM 3380, 3880 and 3990, as well as the company's tape subsystem, the 3480.

Service Director will initially be offered at no charge to customers with the basic IBM Maintenance Agreement, Corporate Service Amendment, Midrange Service Amendment and the Extended Maintenance Option.

According to IBM, Service Director will monitor the storage devices for problems. It has been programmed to call up the local service center and alert an IBM expert system program if a problem occurs. The expert system will analyze the data and recommend the appropriate service procedure. It can then dispatch a customer engineer with its recommendations, including replacement parts.

VMCENTER II
Smart Economics.



The Quality experience: overnight savings of over 90%.

Staying profitable while staying competitive. It's the classic challenge. But with the right tools, you can do it.

That's the lesson at Quality Inns International, where astute information systems management has saved money while helping a worldwide organization deliver superior value to its customers.

SAVINGS IN TIME AND RESOURCES.

From menial chores to management reports, VMCENTER II's comprehensive capabilities have made a decisive difference in the caliber and cost-effectiveness of QI's MIS operations.

Take overnight backups. They used to be a nightmare. Now they're a dream. With better than 90% cost savings in both time and tape—plus better reliability than ever.

Or take disk space management: with easy user archiving, there's suddenly room to grow. Add automated scheduling, foolproof tape handling, improved security, and unprecedented control over batch operations, and no wonder QI's systems management is so strongly "VMCENTERed."

VMCENTER II. THE VM SYSTEMS MANAGEMENT TOOL FOR THE FUTURE.

This performance is impressive. But it's only the beginning. With its broad capability and proven performance, VMCENTER II is the most important tool you can buy for *all* your VM systems—from 9370 to 3090 to whatever the future may bring.

VMCENTER II. Your comprehensive solution for today. Your key to long-term success.

For more information, write or call today.

800-562-7100
703-264-8000

VM Software, Inc.
1800 Alexander Bell Drive
Reston, Virginia 22091

The Quality Choice
Comfort Quality Clarion
Inns · Hotels · Suites · Resorts

1-CWX-890130

VM SOFTWARE INC.

© 1987 VM Software, Inc.

DEC unleashes VAX 6300 line

BY JAMES DALY
CW STAFF

NEW YORK — Digital Equipment Corp. inserted six high-powered entrants into its VAX mid-range line last week, replacing its wildly successful 6200 line and inaugurating a price/performance booster cycle it expects to repeat as often as every nine months.

The increased processing power of the 6300 series also taps the first nails into the coffin lid of the poorly selling VAX high end, the 8800 series. The top-of-the-line 6360, for example, runs at speeds of 22 million instructions per second (MIPS) and costs $751,900, offering comparable performance to the 8840, which is priced at $1.5 million.

DEC Chairman Ken Olsen said the 8800 has sold tepidly since its introduction last March because of the unexpected success of the 6200, which brought symmetrical multiprocessing to the heart of the VAX line when it was introduced last April [CW, April 25]. Although DEC would not release sales figures for the 8800, Vice-President of Mid-Range Systems William R. Demmer said the firm has sold more than $1 billion worth of 6200s and is well beyond $2 billion in sales.

Users have so eagerly exploited the ability to cluster 6200 models that it has "become the fastest selling VAX in our company's history, destroying our planning and embarrassing us in some ways," Olsen said.

According to analysts, the writing has been on the wall regarding the demise of the 8800 for some time. "When the 8800 was announced, DEC still believed it was walking on water," said Barry F. Bosack, an analyst at the New York-based Robert Fleming Securities Ltd. market research house. "Now, DEC wants people converted to symmetrical multiprocessing, and now, they've certainly got a robust enough program to do that," he said.

Analysts also said the series should be a good defense against any inroads IBM's Application System/400 has made into the VAX mid-range. "This blows past the AS/400 pretty quickly and does a good job at taking on the low end of the 370 architecture," said Robert B. Cameron, a senior industry analyst at Dataquest, Inc., a market research house in Boxboro, Mass.

The 6300 line works 35% faster than the predecessor VAX 6200 and sells for only 5% more, company officials said. The line begins with the 6310, which runs at 3.8 MIPS and is priced at $184,100.

Sleek and fast

DEC officials claimed they achieved the added processing performance by shrinking the chip's thickness from 2 microns to 1.5 microns and souping up the chip's innards with a modified gate array and a clock speed that has been cut from 80 nsec to 60 nsec. Demmer boasted that he expects similar performance increases on a regular basis. "We see an accelerating rate of change down the road," he said.

Analysts speculated that this rapid succession rate may initially cause confusion among users. "Buyers have been conditioned by IBM not to expect rapid upgrades," Dataquest's Cameron said. "But DEC has put together a very aggressive pricing scheme that should be an adequate enough lure to get users to try the upgrade. Then the proof will be in the pudding," he said.

This relatively quick technological turnover and imminent demise of the 8800 series spells good news for MIS managers like James Hackett, who stock their shops with used equipment. "We'll wait a little while until the older machines come on the used market," said Hackett, manager of data services at Precision Components Corp. in York, Pa. "We can find a used 8200 for half of what DEC wants for a brand-new one. If you lag behind for a couple of years, you can save yourself an awful lot of money," he explained.

More bang for the buck

Greater multiprocessing flexibility gives VAX 6300s more growth potential

	VAX 6300 series	VAX 6200 series
Performance (in MIPS)	3.8 to 22	2.8 to 11
Memory range (in bytes)	32M to 256M	32M to 256M
Maximum number of CPUs	6	4
Base price range	$184,100 to $751,900	$175,300 to $556,600

SOURCE: DIGITAL EQUIPMENT CORP.
CW CHART: FRANK C. O'CONNELL

No-hassle upgrade

Digital Equipment Corp. moved to undercut any sense of abandonment that new 6200 users may feel, claiming last week that those customers can effortlessly upgrade to the 6300 by simply swapping circuit boards.

The Maynard, Mass.-based company has peppered the upgrade path with several incentive plans that frequently only require customers to pay the price differential between the new 6300 boards and the old 6200 boards, as long as they exercise that option by April 28. According to Stephen Blanchette, DEC's product marketing manager of mid-range VAX systems, this type of bill might run in the neighborhood of $10,000.

Under one such arrangement, DEC would essentially offer a free board swap to users as long as they upgrade their systems to the next more powerful 6300 model. To upgrade a 6210, for example, users would first trade in their old processor for a new 6330 processor, then be required to purchase an additional 6300 processor in order to make their system a 6320, Blanchette said.

"It sounds like an excellent upgrade; we're very interested in it," said David Renaud, director of technical services at Grinnell Mutual Reinsurance Co. in Grinnell, Iowa, where several 6200 models reside.

Even users who are not planning immediate upgrades were impressed with the way DEC has indicated it will make good on a long-standing promise to offer an upgrade path that does not entail scrapping an old system. "It's nice to know it's there, and I'm sure when we're looking for upgrade, this is where we'll look," said Gene Robbins, assistant provost at Queen's College, located in Flushing, N.Y.

JAMES DALY

Amdahl earnings zoom, while AT&T's backpedal

BY NELL MARGOLIS
CW STAFF

Robust sales of its 2-year-old 5890 mainframe line and gathering strength in the newly announced 5990 series powered Amdahl Corp. to a strong fourth quarter and a 53% leap in 1988 profits, the company announced last week.

The Sunnyvale, Calif.-based mainframe maker posted fourth-quarter earnings of $72.98 million, up 38% from last year's comparable quarter, on revenues of $547.71 million — a 13% improvement over the fourth quarter a year ago.

For the year, Amdahl's earnings rose 53% to $223.33 million on revenue of $1.8 billion.

Amdahl's ability to continue to cut a swath in a much-bemoaned marketplace is impressing and surprising analysts.

"I keep betting against them — and I keep losing," Martin Ressinger, an analyst at Duff & Phelps said. Amdahl, he said, has double-pronged advantage over its chief competitor IBM in that it has "better-designed machines and the ability to focus resources on them because they don't have to worry about carrying other, less-successful lines."

Despite — or even because of — such advantages, Ressinger noted, the company's position is somewhat precarious. "They continue to outpace their market by taking sales away from IBM," he said. "But you'd rather have them growing because the market is growing." As matters stand, "you've got to keep wondering when IBM will decide that [Amdahl's incursions] are worth doing something about," Ressinger added.

One step at a time

In other earnings news, AT&T, claiming it stepped backwards to prepare for quantum leaps ahead, reported an anticipated fourth-quarter net loss of $3.34 billion on revenue of $9.21 billion, up 6% from revenue logged in the comparable period last year. For the year, the company netted a loss of $1.67 billion.

Both the quarterly and the annual losses were attributed to a one-time, $6.7 billion fourth-quarter charge against operations resulting from AT&T's network digitization initiative, on which the company is pinning hopes of significant strides in quarters to come.

"Without the charge," Chairman Robert E. Allen said, "we would have shown healthy earnings growth."

Rollouts from A to Z

Other DEC products announced during last week's blitz included the following:

- The VAX Fileserver 6310 and 6320, which offer simultaneous support for DEC VMS, Ultrix and Microsoft Corp. MS-DOS environments and are priced from $141,900.
- A pair of Vaxcluster arrangements using models from the 6300 series. The entry-level 6312 consists of two 6310s, runs at up to 7 million instructions per second (MIPS) and starts at $608,400. The 6333 contains three 6330s, runs at up to 30 MIPS and starts at $2.7 million.
- The DECTP 3000 and DECTP 6000, which are geared toward transaction processing application development and are based on the Microvax 3400 and VAX 6310 systems, respectively. Prices begin at $207,704.
- A complementary line of storage products that includes the SA650 and SA550 storage arrays. The high-end SA650 ranges in price from $103,320 to $243,250 and will be available next month. The mid-range SA550 is priced from $44,000 to $123,000.

Also introduced was the TA90 cartridge-tape subsystem, which DEC claims offers full read/write compatibility with IBM's 3480 cartridge-tape subsystem and the entry-level HSC40 Vaxcluster storage controller. TA90 master unit prices start at $113,276, and optional slave units are priced from $38,748. Both are slated to be available in March. The HSC40 starts at $41,157 and will be available next month.

DEC's optical storage line was also beefed up with the addition of the $205,000 RV64 optical jukebox, a write-once read-many drive that retrieves many disks used for optical information and offers access to 128G bytes of information. A RV64 with host adapter and software is priced from $205,652 and reportedly will be available within 90 days of order.

JAMES DALY

2001 MARCUS AVENUE
LAKE SUCCESS, N.Y. 11042
TELEPHONE (516) 328-7000
FAX (516) 354-4015
TELEX 6973556

Software Engineering of America

COMPANY PROFILE

Dear Mainframe User:

We, at Software Engineering of America, have created this letter at the request of a large number of mainframe users. In light of all the turmoil brought about by the current spate of mergers and acquisitions, many of you have told us that you are interested in the plans and intentions of the companies with which you do business. Since one of our main goals is keeping in tune with the concerns of the user community, we are more than willing to comply.

SEA was founded in February 1982 by a group of professionals with a long history of involvement in the computer industry. The founders brought with them a broad range of expertise in the development and support of high-quality software systems, obtained through experience in industry, government and leading software companies.

The principles upon which SEA was founded are the following:

- To produce a diverse line of integrated system software products, developed and enhanced based on user requirements.
- To provide first-rate support for those products-24 hours a day,7 days a week.

Strict adherence to these very basic principles have propelled SEA from a 1982 startup to our current position of over 6000 licensed users in more than 40 countries. With a consistent ranking in Software Magazine's "Top 50 Independent Software Vendors", SEA has emerged as a leader in the systems software market.

SEA PRODUCT GROUPS

Operations Management

SEA provides a complete line of operations management solutions covering all critical areas, including job scheduling, master console management, report archival, report management and distribution, JCL checking and management, message management, and the complete viewing, archival and retrieval of all types of Sysout and Syslog.

We are the only company that provides such a complete line of operations management software, backed-up by first-rate technical support. With over 2,500 users choosing SEA as their single source for operations management software, SEA has assumed a position of leadership in the field. Many users tell us the reason they have selected our products is superior support, as well as our integrated approach to long term product development.

DASD/Data Management

SEA's DASD/Data Management tools have become corporate standards, used in one out of every five MVS data centers worldwide.

Providing solutions for high-speed storage management, PDS dataset management, sequential dataset management, and VSAM control and optimization, SEA has set a new standard for efficiency and high performance in DASD and data management software.

SUPPORT AND DEVELOPMENT

SEA's Technical Support Department is divided into two levels. First-level support fields all initial contacts. While over 85% of all contacts are resolved on the initial call, if first-level support is unable to provide a solution, the call is transferred to second-level support. All second-level support personnel are members of Product Development Teams. While most calls are solved at the first-level, involvement with technical support keeps SEA developers in greater touch with our users. This procedure enables our developers to respond more effectively to the needs of the user community.

SEA's approach to development is to keep Product Development Teams together, working on specific products for the long term. We have found that this approach generates a high level of dedication and expertise. We believe that this methodology is the reason SEA has received such consistently high ratings from our users, for technical support and product development.

COMPANY ORGANIZATION

SEA is a privately held company, whose growth over the years has been internally funded by product sales. Our users have indicated that they prefer us to remain independent. This independence guarantees our ability to continue to provide the highest standard of product support and development currently available.

Software Engineering of America is proud to supply the mainframe user community with the above information about our company. We would also like to take the opportunity to express our appreciation for the support that we receive from over 6000 users worldwide. In return, we shall continue to deliver to our users, the highest level of dedication and support available in the industry.

If you are currently not an SEA user, we invite you to take a free, no-obligation trial of our products. We are certain you will find, as thousands of others have, that our products will provide cost-effective solutions to your installation's needs.

Thank you,
Software Engineering of America, Inc.

SEA

International Offices
NeübruckestraBe 30 • 4400 Münster • West Germany • Tel. (0251) 54447 • 42569
88A Searle Street • Cambridge / Cambs. CB4 3DD • England • Telephone: (0223) 312147 / 350910

AT&T expected to add more pieces to its UNMA puzzle

BY ELISABETH HORWITT
CW STAFF

MORRISTOWN, N.J. — AT&T is expected to bring out several missing pieces of its Unified Network Management Architecture (UNMA) this week as it continues to push the system as a de facto industry standard. However, UNMA may still be more promise than product when it comes to providing truly standardized multivendor management capabilities, industry sources suggested.

AT&T is also expected to announce the integration of its incompatible private branch exchanges (PBX), the System 75 and System 85, at next week's Communication Networks '89 conference.

AT&T will announce two UNMA integrator products this week, according to Thomas Taylor, president of Avanti Communications Corp. The first offering will be the long-expected link between UNMA and Cincom Systems, Inc.'s Netmaster. This will allow users to monitor logical IBM Systems Network Architecture sessions and physical networking transmissions on the same system, said Jeremy Frank, an analyst at Gartner Group, Inc. in Stamford, Conn. AT&T will also officially release the link between UNMA and IBM's Netview/PC, industry sources said.

The second integrator offering will be enhanced versions of AT&T's previously announced Network Management Protocol (NMP) and Accumaster workstation, Taylor said. The new Accumaster will be based on either AT&T's 3B computer, a Sun Microsystems, Inc. workstation or both and will feature Oracle Corp.'s Oracle relational database management system for collecting and generating reports on traffic and error statistics, alerts and usage data, Taylor said.

Avanti has been working closely with AT&T to integrate its own network management system with UNMA, Taylor said. The T1 multiplexer vendor plans to announce its own Oracle-based network management system at Comnet, he said.

David Langholff, director of telecommunications planning at Mervyn's department stores, has already seen an earlier UNMA release that uses dial-up terminal links to call up alerts and alarms from different network management systems as windows on the same workstation screen. This feature makes it possible to manage a variety of vendors' networking installations from one screen — a boon to companies such as Mervyn's, which uses equipment from 10 to 12 different vendors, Langholff said.

However, AT&T's current system, like Netview/PC, does not provide access to the full functionality of other vendors' network management systems, Langholff said. What users really want is a multivendor system that both monitors and initiates action across the network and collects alarms and configuration data in a common database with a flexible fourth-generation language, he indicated.

Also at Comnet, AT&T is expected to officially release products to integrate its System 75 and System 85 PBX lines. The products, prototypes of which were shown at a users meeting in November [CW, Nov. 21, 1988], will include a central controller to connect the two types of equipment and expansion boards said to add eight digital lines to either PBX.

Introducing CICS RADAR

Policing CICS region outages is a time-consuming, costly process for you, the CICS systems programmer. But now with a new product from Compuware, experienced leaders in system software solutions, you have a new weapon to add to your arsenal: CICS RADAR. With RADAR you can reduce the time it takes to debug system dumps by up to 90%!

CICS RADAR automatically pinpoints the exact location of CICS region failures, regardless of the number of regions, task activity, or stress on the system. Then RADAR produces a report that tells you what happened. You can review the report online, or print it for future reference. RADAR even provides fully menu-driven, interactive access to a compressed and formatted system dump at the touch of a key.

CICS RADAR also helps to prevent future outages with its exclusive "Snapshot" feature. This allows you to perform a complete analysis of any CICS region, before it fails, helping you to guard against unforeseen problems. And CICS RADAR is compatible with the Compuware Command Center.™

If you need speed *and* control in your fight against CICS region failures, call Compuware today about a free 30-day CICS RADAR trial. Compuware Corporation, 31440 Northwestern Highway, Farmington Hills, MI 48018. (800) 521-9353. In Michigan, call (313) 737-7300.

COMPUWARE
Because experience is everything.

CICS RADAR is a trademark of Compuware Corporation.
© 1989, Compuware Corporation.

Travelers cuts graze MIS group; 12 to be idled

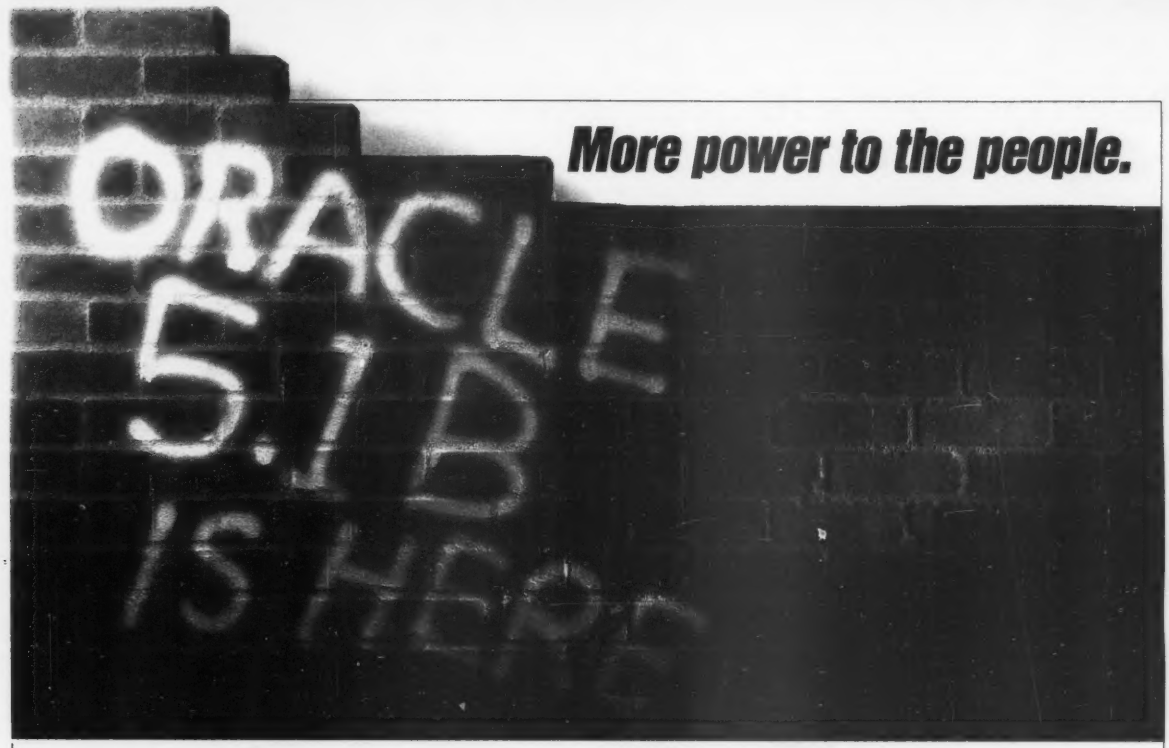
BY ALAN J. RYAN
CW STAFF

HARTFORD, Conn. — Twelve positions within The Travelers Corp.'s data processing group will be among the 225 jobs cut within the organization during the next year.

Travelers spokesman Alan Fletcher said that the cutbacks are part of the company's cost-benefit analysis program, which was designed to look at all of the tasks within the firm and decide which ones could be eliminated, streamlined or combined.

The 12 DP workers affected participated in a voluntary separation option that was offered to them, Fletcher said. Of the 225 affected by the cutbacks, 155 fall under the voluntary separation category, he added. Severance packages for all employees affected by the latest cuts include a minimum of 60 days' notice and up to one year's salary.

The recent cuts are part of the second tier of the analysis program and included the study of 2,000 jobs, Fletcher said. The first tier of the program, which began last year, resulted in the elimination of nearly 900 jobs; since the beginning of the program, Travelers has identified savings to the company of close to $145 million by studying its operations. Travelers employs approximately 34,000 full-time workers.



More power to the people.

ORACLE has led a revolution in PC relational database technology. More power. More portability. More connectivity. More reasons than ever to make ORACLE your corporate standard database.

PC MAGAZINE EDITORS' CHOICE

New tools with even more power.

We're proud to announce our newest release—Professional ORACLE Version 5.1B. Now you can run your applications in OS/2 or in protected mode above 640K in MS-DOS. So you have more room for more powerful applications. And those same applications run unmodified on almost all workstations, minicomputers and mainframes.

Version 5.1B delivers a new level of power to your PC developers including the latest versions of:

- **SQL*Forms®** NEW! Enhanced 4th-generation application development environment.
- **SQL*Menu®** NEW! Flexible interface builder for defining complex menu systems.
- **SQL*ReportWriter™** NEW! Nonprocedural development and runtime powerhouse for producing any report.
- **SQL*Plus®** Oracle's ANSI-standard SQL query and administration tool.
- **Pro*C™** The C-language precompiler and subroutine call interface to ORACLE.

Learn SQL on us.

Learn the language of the revolution. Order Professional ORACLE today for $1299 and we'll include ORACLE SQL*Tutor, a nine-module PC-based SQL instruction program that sells by itself for $199.

Try ORACLE for $199.

Our Trial Version is identical to Professional ORACLE, but can't be used in networked configurations and allows a maximum user database size of 1 MB. It's a powerful tool for prototyping your first ORACLE application. And its price can be applied to the purchase of a full Professional ORACLE license.

ORACLE®

COMPATIBILITY • PORTABILITY • CONNECTABILITY

Call 1-800-ORACLE1, ext. 8131 today.

Money-back guarantee.

If you haven't tried ORACLE yet, now there's even more reason to join the SQL revolution. More tools. More power. If ORACLE 5.1B doesn't revolutionize the way you develop PC database applications, return it within 30 days for a full refund.

Call 1-800-ORACLE1 ext. 8131, or an ORACLE MasterVAR today.

Dear Oracle

Oracle Direct • 20 Davis Dr. • Belmont, CA 94002
1-800-ORACLE1, ext. 8131

Since your 30-day money-back guarantee eliminates any risk on my part, please send me the software below. Enclosed is my ☐ check, or ☐ VISA ☐ MasterCard ☐ AmEx credit card authorization. Offer valid only in the USA.
Please send ☐ 5.25" High Density or ☐ 3.5" disks.

☐ Professional ORACLE for MS-DOS with free ORACLE SQL*Tutor for $1299 ..... $_____

☐ Professional ORACLE for MS-DOS Trial Version for $199 ..... $_____

☐ Professional ORACLE for OS/2 for $1299 ..... $_____

Professional ORACLE Requirements: MS-DOS—80286/80386 PC with MS-DOS V3.1+, hard disk, 640KB of memory and 896K extended memory required. 2.5MB of extended memory recommended (required for SQL*ReportWriter). OS/2—80286/80386 PC w/ OS/2 V1.0, hard disk, 3MB memory. SQL*ReportWriter not available for OS/2 and is replaced by SQL*Report®

☐ Just send ORACLE SQL*Tutor for $199 ..... $_____
Minimum Requirements: 256K PC with hard disk. Color monitor suggested.

Subtotal ..... $_____

Please add appropriate sales tax ..... $_____

Total enclosed/authorized (USA only) ..... $_____

NAME TITLE

COMPANY

STREET (no P.O. boxes, please)

CITY STATE ZIP

PHONE

CREDIT CARD NO. CARD EXPIRATION DATE

SIGNATURE TODAY'S DATE COMPUWORLD

Copyright ©1989 by Oracle Corporation. ORACLE, SQL*Forms, SQL*Menu, SQL*Plus and SQL*Report are registered trademarks and Pro*C and SQL*ReportWriter are trademarks of Oracle. Also trademarks: MS of Microsoft, OS/2 of IBM. TRBA

Dbase IV on course for some users

BY DOUGLAS BARNEY
and PATRICK WAURZYNIAK
CW STAFF

TORRANCE, Calif. — Despite widespread reports of bugs, glitches and anomalies, early users are already saving time and creating snazzier applications with Ashton-Tate Corp.'s Dbase IV.

Instead of spending time with the new SQL component, most users interviewed were concentrating on Dbase IV's ease-of-use features. With the Control Center interface and a new application generator, these users have developed applications without resorting to the painstaking programming process.

While many large corporations plod through an elaborate evaluation process, smaller organizations have jumped on the Dbase IV bandwagon.

For instance, spectators at this week's Los Angeles Open professional golf tournament will be greeted with a network of 25 personal computers running Dbase IV. The system will provide golfers' biographies and up-to-date scores. Golfing advocate and Dbase programmer Rick Guerrero used Dbase IV to develop the system that will also allow CBS to keep television viewers apprised of the latest results. CBS will also be fed stray facts such as how many golfers bogeyed on the 18th hole in the first round of play.

"The thing Dbase IV gives is pizzazz. It gives the system the visual appeal with its pop-up windows," said Guerrero, president of Lake Avenue Software, a Pasedena, Calif.-based developer of golf software. The L.A. Open application was written from scratch in Dbase IV and took about five months to build.

Los Angeles residents may soon get their contact lenses prescribed by Dbase IV. Programmer Christopher A. Toughill has nearly completed a system that takes the parameters of a human eye and, with predefined formulas, recommends a contact lens prescription.

The system will also learn from its mistakes. Employees at the Contact Lensbank in Torrance, Calif., will feed the computer the prescription that was given after a traditional fitting. "The next time it recommends a lens, it checks back to the actual fitting," Toughill explained. If the system has been consistently wrong, it will adjust accordingly. According to Toughill, this type of application would have been impossible to build using Dbase III Plus.

The best part for Toughill, he said, is ease of development: "Dbase IV allows me to develop an application in two hours that would take two weeks in Dbase III Plus."

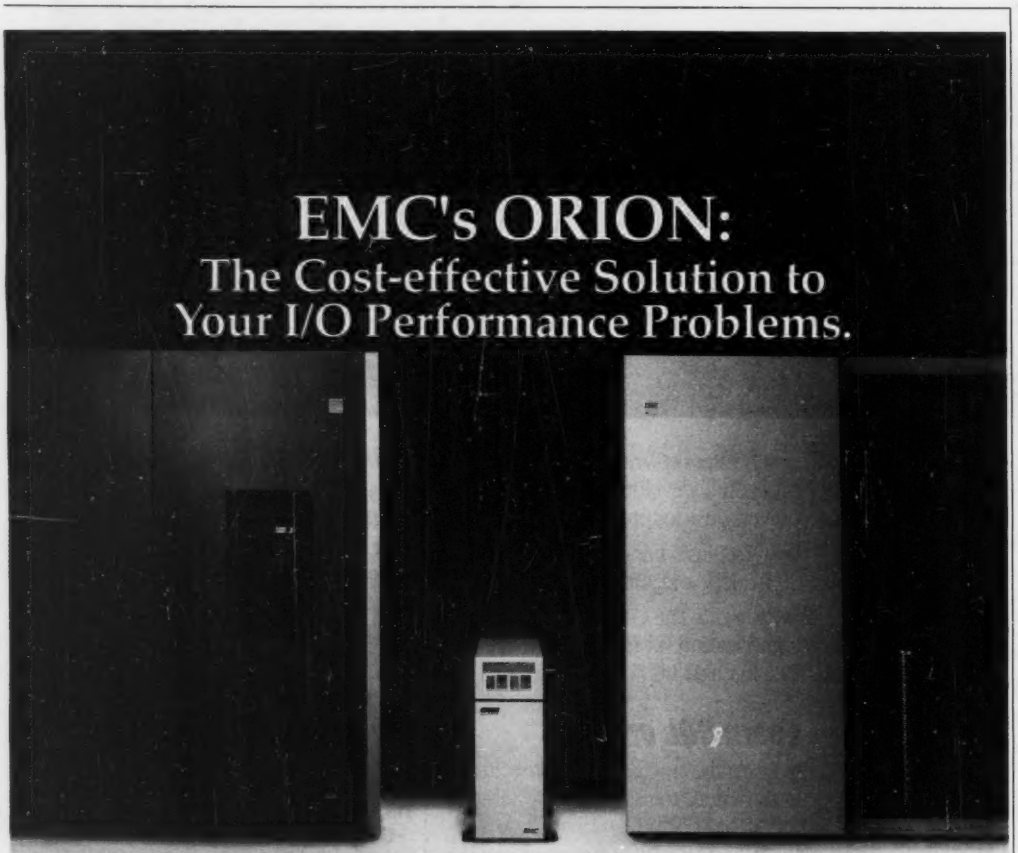
Rent due

Thanks to Dbase IV, the 1,100-unit Pavilion Apartments in Chicago has a new accounting system in the works. Pavilion assistant manager and programmer Mike Henneberry has been using Dbase IV at home on his IBM Personal Computer XT-class machine.

"It will develop full applications from the application generator and the Control Center," Henneberry said. "I'm not writing as much code." With Henneberry's application, apartment managers will be able to type in a tenant's name and check his billing status. With Dbase IV, managers will have an easier time retrieving data with the use of pull-down menus.

At the California Trucking Association in West Sacramento, Calif., MIS manager Stephen Saks envisions the new Dbase allowing novice PC users to tackle mundane, everyday programming tasks, freeing expert programmers for more sophisticated programming models. Saks said Dbase IV's Control Center has made a huge improvement on Ashton-Tate's previous Dbase menuing system.

Out since last October, Dbase IV is starting to catch on. Ashton-Tate has been shipping 20,000 to 25,000 units per month, Goldman Sachs & Co. analyst Rick Sherlund said.



EMC's ORION Solid State Disk Subsystem

Maximum Performance

EMC's ORION is the fastest solid state disk subsystem available for your mainframe computer. ORION features a technologically advanced design enabling you to receive unprecedented performance gains.

An integrated 3880 type storage director, in addition to features inherent in solid state technology, gives ORION an access time of 0.1 millisecond — a performance milestone.

What's more, EMC protects your investment by making ORION compatible with all IBM 370 and IBM PCM computers. Therefore, performance boosts are realized well into the future, when CPU upgrades become necessary.

EMC's ORION — the I/O solution you have been waiting for to maximize your system's performance and productivity.

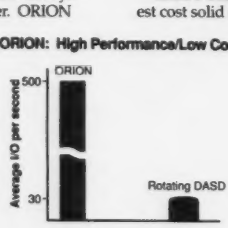
Minimum Price

EMC's ORION Solid State Disk Subsystem is the lowest cost solid state solution to your I/O performance problems. Its state-of-the-art design gives you a substantial return on your investment for years to come.

ORION's small footprint and low power requirements eliminate costly computer room renovations. Ease of installation and low cost of ownership make ORION an expedient and economical solution to your I/O performance problems.

EMC's ORION — the most economical performance boost for your current and future mainframe systems.

ORION: High Performance/Low Cost



EMC²
The System Enhancement Company.

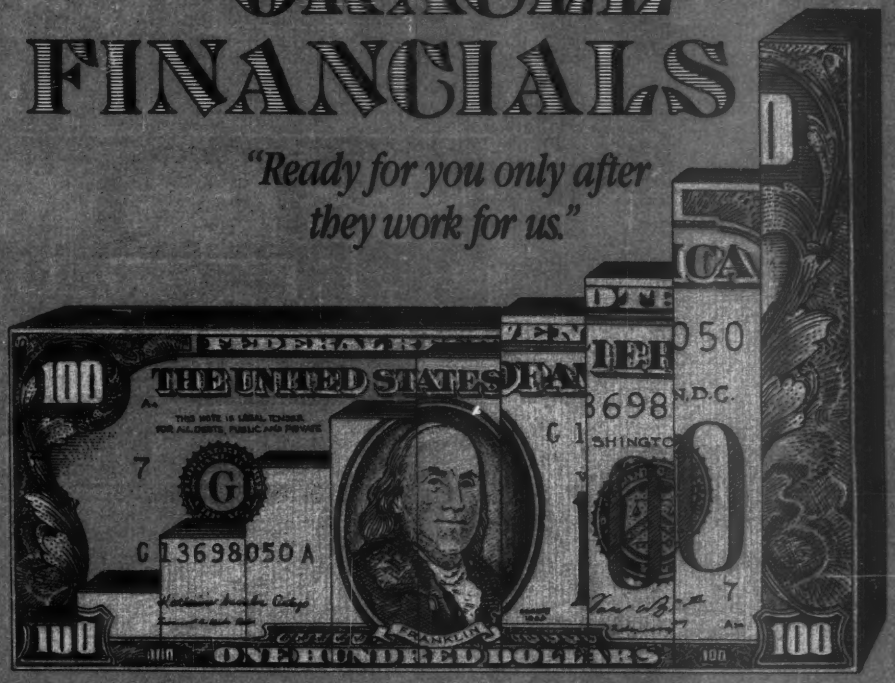
IBM is a registered trademark of International Business Machines Corp.

For more information, call:
1-800-222-EMC2
In Mass., call (508) 435-1000

Copyright 1988 EMC Corporation

Announcing ORACLE FINANCIALS

"Ready for you only after they work for us."



Oracle Financials

Oracle General Ledger,™ Oracle Payables,™ Oracle Purchasing™ and Oracle Assets™ applications have world-class functionality, yet are so easy to use that you may not bother to read documentation. Not only can they do anything you need to do, but they do it effortlessly and on the computer of your choice—mainframe, minicomputer or workstation—at the location of your choice.

"...Oracle Financials seem too good to be true. They offer full-featured accounting capabilities... without having to write any applications."
— Howard Ember, Treasurer, Tootsie Rolls

The best software quality control in the world

"By being the very first production user, Oracle demonstrated their absolute confidence in the financial software they intended to sell. This quality control alone makes Oracle Financials worth a close look."
— David Thomas, Hambrecht & Quist

In three years, Oracle's sales grew from $25 million to almost $300 million. They went from 1000 customers to over 10,000, from 2 products to over 100, from $15 million in total assets to over $250 million with several major corporate reorganizations along the way. Oracle Financials were there every step of the way.

"Oracle Payables is one of the few packages we evaluated that can really deal with the demands of a very large company. And by being able to implement Oracle Financials on our existing minicomputers, we saved $500,000 over the cost of other alternatives."
— Michael Prince, Data Processing Manager, Burlington Coat

*"The flexibility of Oracle Financials lets us focus on our company's growth, not our accounting systems. Whatever your industry, whatever the size of your company, we are certain that these products will work for you. **We invite you to attend the next Oracle Financials briefing and demonstration in your area."***
— Jeffrey L. Walker, Senior VP, CFO Oracle Corporation

Copyright © 1988 by Oracle Corp. Oracle Financials, Oracle General Ledger, Oracle Payables, Oracle Purchasing and Oracle Assets are trademarks of Oracle. TR9A

ORACLE®

Call 1-800-345-DBMS, ext. 8110 today.

20 Davis Drive, Belmont, CA 94002 • World Headquarters (415) 598-8000 • Calgary (403) 269-3622 • Ottawa (613) 238-2361 • Quebec (514) 337-9755 • Toronto (416) 595-7750 • ORACLE Systems Australia 61-2-959-5080 • ORACLE Europe 44-1-946-6911 • ORACLE Systems Hong Kong 852-5-268846

Oracle Financials Seminars

AK	Anchorage	Feb 6
AZ	Phoenix	Feb 7
	Scottsdale	Apr 11
CA	Costa Mesa	Jan 24 Apr 25 Jun 22
	Los Angeles	Jan 19 Mar 14 Apr 20
	Ontario	Mar 21
	Sacramento	Mar 21
	San Diego	Jan 17 Mar 16
	San Francisco	Jan 24 Mar 29 May 18
	Santa Clara	Jan 12 Mar 9
	Universal City	Apr 6
CO	Englewood	Jan 31 Mar 7 Jun 6
CT	Farmington	Mar 7
	Stamford	Mar 21 Jun 8
FL	Boca Raton	Feb 7
	Jacksonville	Jan 19
	Miami	Jan 17
	Tampa	Mar 22
GA	Atlanta	Jan 17
	Savannah	Apr 27
HI	Honolulu	Mar 14
IA	Des Moines	Jan 17
ID	Boise	Apr 13
IL	Chicago	Jan 25 Feb 28 Mar 21 Apr 18 Jun 14
IN	Indianapolis	Jan 31 Mar 22 Jun 7
KY	Louisville	Apr 4
LA	New Orleans	Jan 27
MA	Boston	Jan 17 Apr 20 Jun 6
	Burlington	Mar 15
MD	Baltimore	Apr 12
	Columbia	Mar 15
ME	Portland	Mar 2
MI	Dearborn	Feb 7 Apr 4
	Grand Rapids	Jan 12 Mar 8 Jun 6
	Lansing	Feb 14
	Troy	Mar 7 Jun 7
MN	Minneapolis	Jan 11 Mar 14 Jun 13
MO	Kansas City	Jan 26 Jun 27
	St. Louis	Jan 12 Mar 9 Jun 6
NC	Raleigh	Jan 10
NE	Omaha	Apr 6
NJ	Iselin	Feb 15 Mar 30 Jun 28
	Princeton	Jan 18 Mar 15
	Secaucus	Jan 26 Mar 2 Apr 19
NM	Albuquerque	Mar 7 Jun 7
NY	Buffalo	Jun 6
	East Syracuse	Jun 15
	Fairport	Feb 9
	Melville	Jan 18 Mar 15
	New York City	Jan 25 Feb 22 Apr 19 Jun 14
OH	Akron	Feb 1
	Beachwood	Apr 5
	Cincinnati	Jan 26 Mar 23
	Columbus	Jan 12 Mar 9
OK	Oklahoma City	Feb 8
	Tulsa	Jan 24
OR	Portland	Mar 14
PA	Philadelphia	Feb 6 Apr 10 Jun 19
	Pittsburgh	Jan 18 Mar 15 Jun 14
	Scranton	Feb 15
RI	Providence	Feb 2
SC	Charleston	Mar 9
	Greenville	Feb 8 Apr 13
TN	Memphis	Apr 19
	Nashville	May 4
TX	Austin	Jan 19
	Dallas	Jan 10 Feb 1 Mar 7 Apr 4 May 4 Jun 7
	Houston	Jan 12 Feb 9 Mar 9 Apr 6 May 4 Jun 8
	San Antonio	Jan 20
UT	Salt Lake City	Feb 1
WA	Seattle	Jan 5 Feb 21 May 17
	Spokane	Apr 25
WI	Madison	Feb 22
	Milwaukee	Jan 26 Mar 8 Jun 6

Attn: National Seminar Coordinator
Oracle Corporation
20 Davis Drive
Belmont, California 94002
1-800-345-DBMS, ext. 8110

☐ My business card or letterhead is attached. Please enroll me in the *FREE* Oracle Financials seminar to be held

at: _____

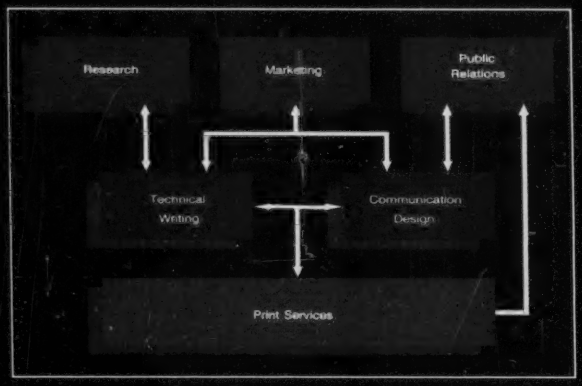
on: _____

COMPUTERWORLD

THE SAS®

Powerful.

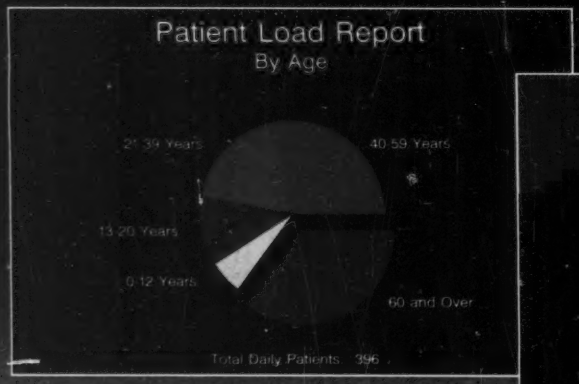
The SAS System brings today's power-hungry PC users efficient data management, an easy report generator, customized presentation graphics, superior statistics, and more. You get the strength and flexibility that make SAS software so indispensable on mainframes and minicomputers.

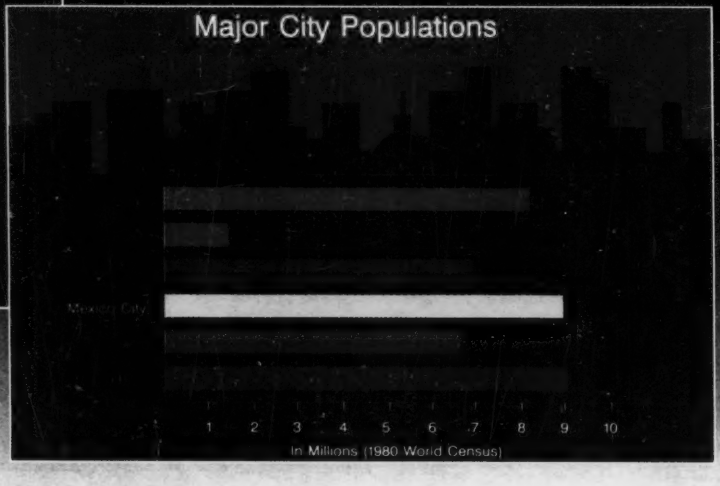


Productive.

The SAS System has integrated applications to use "as is" or customize to fit your needs. Plus a built-in micro-to-host link just for your PC.

Read data in any format from any file including dBASE® and Lotus® 1-2-3.® Then analyze and display your data through interactive windows.

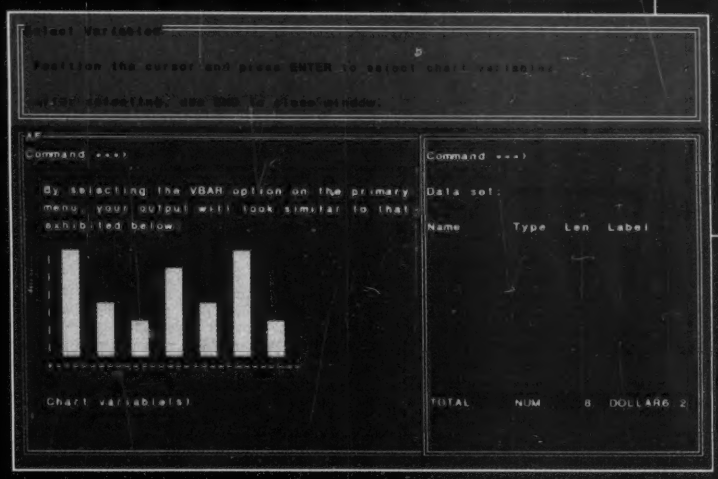


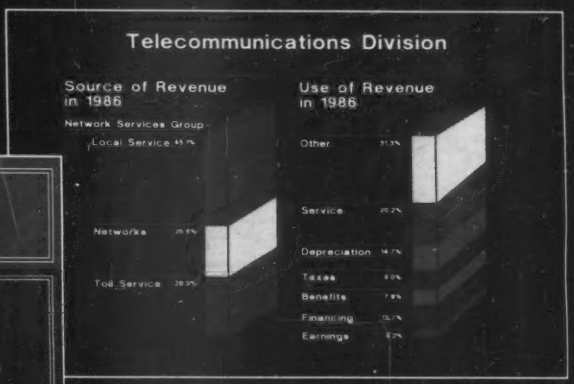


The SAS System runs on the IBM PC AT, XT, and PS/2; IBM 370/30xx/43xx and compatible mainframes; Digital Equipment Corporation's VAX™ series minicomputers and workstations; Data General Corporation's ECLIPSE® MV series; and Prime Computer, Inc.'s 50 series. Not all products are available for all operating systems.

SAS is the registered trademark of SAS Institute Inc., Cary, NC, USA. dBASE is a registered trademark of Ashton-Tate. Lotus and 1-2-3 are registered trademarks of Lotus Development Corp. Copyright © 1987 by SAS Institute Inc.

Printed in the USA.


Command ===>
By selecting the VBAR option on the primary menu, your output will look similar to that exhibited below.
Chart variable(s)
Command ===>
Data set:
Name Type Len Label
TOTAL NUM 8 DOLLARS 2

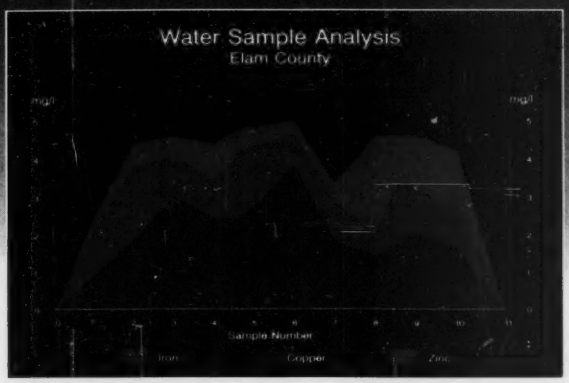


Prove it on Your PC.

Personable.

The SAS System simplifies applications development with a new menu-building tool. Even first-time users will find it easy to analyze, report, and display data...just by filling in the blanks.

Maintaining the SAS System is easy, too. You receive automatic updates and technical support. And high-quality training is available direct from SAS Institute.



SAS Institute Inc.
SAS Circle ☐ Box 8000
Cary, NC 27512-8000
Phone (919) 467-8000
Fax (919) 469-3737

I'd like to know more about the SAS® System for personal computers. Send me a free demonstration diskette, plus details about a free 30-day software trial.

Name

Title

Company

Mailing Address

City State ZIP

Telephone CW30JAN89

Mail to: SAS Institute Inc.
Attn: CC
SAS Circle ☐ Box 8000
Cary, NC 27512-8000

Court order saves Reagan Profs tapes

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — White House officials are upset over a last-minute court order that is preventing them from erasing computer files from the closing days of the Reagan administration.

White House attorneys argued that purging the IBM Professional Office System (Profs) files — like cleaning out desks — is necessary for a smooth transition to the Bush administration.

But a lawsuit filed by a research institute, the National Security Archive, argued that erasing the magnetic tapes would deprive the public of historically significant records in violation of the Presidential Records Act. The suit noted that the Profs electronic mail system was the source of the revealing National Security Council (NSC) messages uncovered in the Iran-*contra* scandal.

Tape pause

At an emergency hearing Jan. 19, a day before President Bush's inauguration, U.S. District Judge Barrington D. Parker issued a temporary restraining order preventing further erasures of Profs tapes.

The plaintiffs said the suit was filed after government archivists decided that Profs messages printed in paper form would be saved but that messages that existed only on tape would not be preserved as a permanent record.

Assistant Attorney General John R. Bolton said there was no sinister plan to destroy files. He reportedly argued that leaving the tapes full of Reagan administration files would "affect the ability of the new president to get his administration up and running."

A full trial in the case, *Armstrong* v. *Reagan*, was assigned to U.S. District Judge Charles R. Richey but has not yet been granted a court date.

White House attorneys sought a quick resolution to the issue last week. "To allow those issues to remain in limbo any longer than is necessary impairs the utility of the system to the new administration," the U.S. Department of Justice filing said.

The White House's Profs system gained national notoriety in 1987, when investigators of the Iran-contra scandal discovered that, although NSC staff member Lt. Col. Oliver North had deleted or altered many embarrassing Profs messages from his terminal, copies of the messages could be retrieved from the system's backup archive [CW, March 2, 1987].

Sun
Tek
IBM
Mitek
apollo
hp
Your Connectivity Source
Getting today's diverse computer systems to communicate with each other is one of the toughest operational tasks you may face.
While others have been talking about the problem, Mitek Systems has developed a range of OpenConnect solutions for system connectivity. The Mitek OpenConnect approach means your IBM host can talk back and forth to your VAX, AT&T 3B, HP, IBM PC, Apollo, Sun, Tektronix workstations, and just about any other system, including those you may need in the future.
Mitek OpenConnect solutions are now in many of the Fortune 500 companies and in some of the world's largest data centers. Let Mitek's OpenConnect approach help solve your connectivity problems. Call today:
(214) 490-4090
Mitek SYSTEMS
Corporate Headquarters
2033 Chennault Drive • Carrollton, Texas 75006
(214) 490-4090 • FAX: (214) 490-5052

Lap Mac

CONTINUED FROM PAGE 1

[for introduction], and we haven't been promised a prototype," said Mary Howlett, manager of office automation at Hughes Aircraft Co.'s Ground Systems Group. "I get the impression from them that it's still in the future."

Howlett, who said a Mac portable tops her wish list, has signed a nondisclosure agreement and declined to discuss the portable in any detail.

Apple's failure to introduce the portable is testing the patience of corporate users who have been hearing of the system's existence for more than a year. They said they are willing to pay the premium price the Mac portable is expected to command.

"I think it'll be a big seller," said Mike Bailey, a systems integrator at Lockheed Corp.'s Missiles & Space Systems and president of the Apple Professionals Exchange. "There are a lot of people who are on the road that need something light to do presentations and graphics, and they have a lot of money to spend."

Like others, Jeff Ehrlich, MIS manager at General Electric Co.'s medical products group, said he eagerly awaits the product's introduction. "I hope it'll be out by the summer," he said. "But Apple doesn't take it out of the oven before it's done."

Ehrlich said Apple has shown a number of different configurations of the portable to major accounts. "They've had a lot of different models," he said. "They're still doing a lot of design work. Unlike IBM, Apple makes design changes at the last minute."

Apple has settled on "active-matrix" technology for the screen, according to corporate customers who were briefed on the product. The Mac's graphical user interface requires a very high-resolution screen so that icons will be legible to users. "The screen is where they're punching through on the technology," Ehrlich noted. However, Apple has experienced difficulty manufacturing that screen in the quantities it desires, according to the sources.

A source close to Apple said the company wants to reach a production yield of 15,000 displays per month before the portable's introduction.

Apple engineers are changing another design element, the source added. In an earlier design, the portable's battery pack was built into the machine. However, Apple has reconsidered, opting to make the battery pack removable.

Reading someone else's copy of Computerworld?

YES, I want to receive my own copy of COMPUTERWORLD. Please send me 51 weekly issues for only $39.00* — just 76¢ per copy. In addition, I'll receive FREE bonus issues of COMPUTERWORLD FOCUS.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Basic Rate: $48

* U.S. Only. Canada $110, Central/South America $135, Europe $195 (Airmail), all other countries $295 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/ Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   IS/MIS/DP MANAGEMENT
   - 10. Vice President, Asst. VP
   - 21. Dir., Mgr., Suprv. IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 38. Data Comm. Network/Systems Mgt.

   OTHER COMPANY MANAGEMENT
   - 11. President, Owner/Partner, General Mgr.
   - 12. Vice President/Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt.
   - 51. Sales/Mktg. Mgt.

   OTHER PROFESSIONALS
   - 60. Consulting Mgt.
   - 70. Medical, Legal, Accounting Mgt.
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Supermins
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

E4905-3

Reading someone else's copy of Computerworld?

YES, I want to receive my own copy of COMPUTERWORLD. Please send me 51 weekly issues for only $39.00* — just 76¢ per copy. In addition, I'll receive FREE bonus issues of COMPUTERWORLD FOCUS.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Basic Rate: $48

* U.S. Only. Canada $110, Central/South America $135, Europe $195 (Airmail), all other countries $295 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. BUSINESS/INDUSTRY (Circle one)
   10. Manufacturer (other than computer)
   20. Finance/Insurance/Real Estate
   30. Medicine/Law/Education
   40. Wholesale/Retail/Trade
   50. Business Service (except DP)
   60. Government — State/Federal/Local
   65. Communications Systems/Public Utilities/ Transportation
   70. Mining/Construction/Petroleum/Refining/Agric.
   80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   90. Computer/Peripheral Dealer/Distributor/Retailer
   75. User: Other _____
   95. Vendor: Other _____ (Please specify)
2. TITLE/FUNCTION (Circle one)
   IS/MIS/DP MANAGEMENT
   10. Vice President, Asst. VP
   21. Dir., Mgr., Suprv., IS/MIS/DP Services
   22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   23. Dir., Mgr., Suprv., Analyst, of Systems
   31. Dir., Mgr., Suprv., of Programming
   32. Programmer, Methods Analyst
   35. Dir., Mgr., Suprv., OA/WP
   38. Data Comm. Network/Systems Mgt.

   OTHER COMPANY MANAGEMENT
   11. President, Owner/Partner, General Mgr.
   12. Vice President/Asst. VP
   13. Treasurer, Controller, Financial Officer
   41. Engineering, Scientific, R&D, Tech. Mgt.
   51. Sales/Mktg. Mgt.

   OTHER PROFESSIONALS
   60. Consulting Mgt.
   70. Medical, Legal, Accounting Mgt.
   80. Educators, Journalists, Librarians, Students
   90. Others _____ (Please specify)
3. COMPUTER INVOLVEMENT (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Supermins
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

E4905-3

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

X/Open promises interface definition

BY AMY CORTESE
CW STAFF

BOSTON — X/Open Company Ltd. officials laid out plans last week for specifying a Common Application Environment (CAE) for Unix systems. X/Open intends to define a high-level user interface definition in 1989, introducing yet another force shaping the battle for graphical user interface dominance.

X/Open is a standards specifier, basing its CAE for Unix systems on official or de facto standards. However, in the area of a graphical user interface, Mike Lambert, X/Open's chief technology officer, said not only is there not likely to be consensus on any one product, but there are no market-ready products at the moment.

Nonetheless, the consortium plans to announce a comprehensive user interface definition this year, including a tool kit and look and feel.

Playing favorites

Bill Bonin, marketing officer of X/Open's North American operations, said that in establishing the interface definition, X/Open will not specify any company's product, although the interface definition may favor one.

Given the makeup of X/Open's board — half Unix International, Inc. members allied with AT&T and half Open Software Foundation (OSF) members opposed to AT&T's "control" of Unix — the likelihood of a speedy agreement appears slim, with each group touting its own interface.

Although X/Open officials claimed the board is cooperative, other accounts indicated that the group is logjammed when it comes to decision making. Supporting the latter scenario, the third edition of X/Open's Portability Guide, which details the latest additions to the CAE and was originally due in mid-1988, has not yet been issued.

However, support of X/Open by these and other industry groups has made it a unifying element in the Unix world. Both the OSF and Unix International have stated that their versions of Unix will comply with the CAE and have pledged support of future standards that X/Open defines. Currently, X/Open specifies only the lowest level of a graphical user interface, based on MIT's X Window System library.

X/Open has already conducted evaluations of graphical user interface technologies. Based on a study of tool kits, Lambert ruled out the feasibility of an IBM Presentation Manager tool kit for Unix. He said that the Presentation Manager programming interface could not be implemented on X Window System because X Window is network-based, while Presentation Manager is not.

Look and feel of interfaces

Also studied was the look and feel of various interfaces, including those from Hewlett-Packard Co., AT&T and Digital Equipment Corp. The evaluation will be expanded to include the Apple Computer, Inc. Macintosh and Next, Inc. interfaces. In this study, X/Open concluded that although the applications looked similar, the differences were in the feel, or whether a user gets the same result by pushing the same button.

Separately, X/Open added new members and opened a new office last week. X/Open's Asian operations will be managed by a new Japanese office, which officially opened last Monday. The addition of Apollo Computer, Inc., Hitachi Ltd. (both members of the OSF) and NEC Corp. and Prime Computer, Inc. (both Unix International supporters) preserves the OSF-Unix International balance of power on the board. Sweden's Nokia remains the neutral swing vote.

Two large petroleum interests, Arco Oil & Gas Co., a division of Atlantic Richfield Co., and the Royal Dutch/Shell Group, were added to the User Advisory Council.

International telecom plans to cut costs

IDG NEWS SERVICE

BASKING RIDGE, N.J. — AT&T, British Telecom International and Japan's Kokusai Denshin Denwa (KDD) recently announced plans to introduce digital services that they claim will reduce the cost of international communications.

The companies said they expect to introduce switched 56K and 64K bit/sec. transmission services between the three nations this year. These services will be the first to come out of an implementation plan based on the evolving international standards for Integrated Services Digital Network.

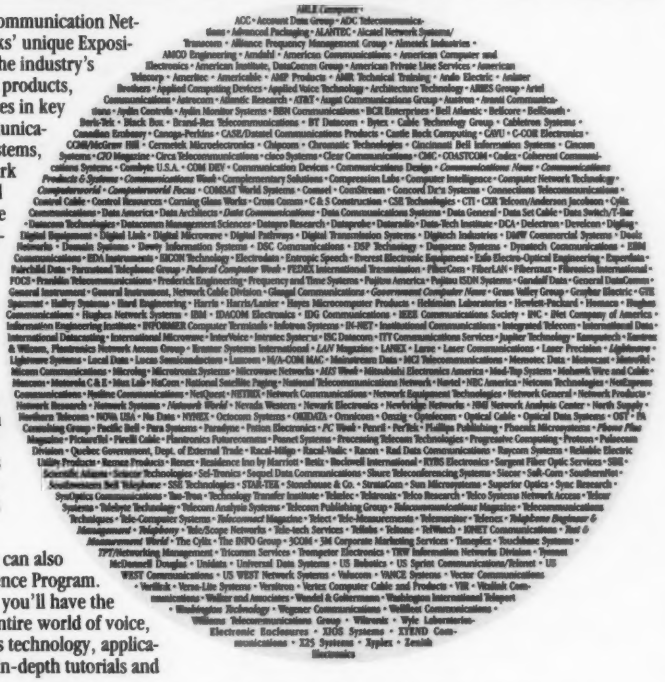
The digital services will allow customers to send six-second, photocopy-quality facsimiles and electronic data files between personal computers as well as use desk-to-desk video teleconferencing, the vendors said.

You can discover the world of communications-FREE with this ticket.

At Communication Networks' unique Exposition, you'll see over 350 of the industry's leading exhibitors displaying products, systems, software and services in key areas such as: satellite communications, PBX and telephone systems, fiber optics, LANs and network management and control. All under one roof. You'll get the information you need to connect your organization with the world business community for maximum operating efficiency and productivity.

What's more, CN '89 has been selected by the U.S. Department of Commerce to participate in its elite Foreign Buyer Program. So you'll be able to meet decision makers from around the world with similar goals, responsibilities and priorities.

And while you're there, you can also participate in the CN Conference Program. During three intensive days, you'll have the opportunity to explore the entire world of voice, data and telecommunications technology, applications and policy through 18 in-depth tutorials and 80 conference sessions.



For more information about the Conference Program and fees, call toll-free 1-800-225-4698 or 508-879-6700, Ext. 646.

FOR FREE ADMISSION TO EXHIBITS:
Take this ticket to the Registration Area to discover the world of communications and save $20.

Exhibitor list as of 11/25/88.

COMMUNICATION NETWORKS
CONFERENCE & EXPOSITION

Answering the challenge in a changing world.

Washington, D.C. February 6-8, 1989

Communication Networks is produced by IDG Conference Management Group, an International Data Group company, 20 Speen Street, Framingham, MA 01701.

COMMUNICATIONS NETWORKS '89
EXPOSITION TICKET

Answering the challenge in a changing world.

Washington, D.C. Convention Center
900 Ninth Street, N.W.
Washington, D.C. 20001

February 6-8, 1989

CW

ADMIT ONE FREE
(A $20 VALUE)

Good for admission to Expo only (no one under 16 years of age admitted).

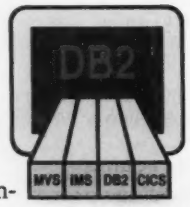
COME EARLY AND SEE EVERYTHING.

Exposition Hours:
Mon., Feb. 6, 9:30 a.m.- 6:30 p.m.
Tue., Feb. 7, 8:30 a.m.- 6:30 p.m.
Wed., Feb. 8, 8:30 a.m.-12:00 p.m.

Registration Hours:
Sun., Feb. 5, 1:00 p.m.- 6:00 p.m.
Mon., Feb. 6, 6:30 a.m.- 6:00 p.m.
Tue., Feb. 7, 6:30 a.m.- 6:00 p.m.
Wed., Feb. 8, 6:30 a.m.-11:00 a.m.

DB2 MANAGER
TAKES THE WRAPS OFF DB2 PERFORMANCE.

When you start using DB2 as a real production tool, you need more than a little insight into the performance of DB2 internals. You need to see what's happening in and around your DB2 subsystem. And for that, you need DB2 MANAGER. It's the only online DB2 performance tool you can integrate with a full range of performance software to provide complete DB2 performance management.



You'll see the impact of entire transactions, from initiation to completion. From CICS and IMS to DB2 and back. So you can easily identify the real cause of problems.

You can also manage multiple, even remote, DB2 systems from one terminal. For the really big picture, you can manage CICS and IMS subsystems in a single session. That's a performance picture you can't get anywhere else.

For further information on DB2 MANAGER, call Chris Walker today. In California: 800-624-5566. Outside California: 800-822-6653. Boole & Babbage, Inc. 510 Oakmead Parkway, Sunnyvale, CA 94086.

Boole & Babbage

International sales and support provided through The European Software Company, a member of the Boole & Babbage worldwide network of companies.

Betting on the micro-to-mainframe link

IBM WATCH

ROBERT TASKER

Despite IBM's current success with its latest departmental processor, the Application System/400, the company is betting on a future computing strategy that emphasizes a two-tier architecture consisting of the combined features of its new mainframe and microcomputer software and hardware.

This strategy is targeted at meeting the major corporate processing requirements of the 1990s. It is based on the IBM 3090 S model and the Personal System/2 running MVS Version 3.0 — informally known as Enterprise Systems Architecture (ESA) — and OS/2, respectively.

The familiar three-tier architecture, consisting of a mainframe platform, a departmental processor and personal computers, gained general corporate acceptance in the early to mid-1980s. Conventional wisdom held that the middle layer of processing, the departmental machine, offered the legitimate dawning of the distributed age of data processing for the average MIS shop.

IN SPITE OF bombastic vendor claims, the age of truly distributed processing is not here now and will not be for another 24 months or so.

Though departmental computing brought some relief to end users frustrated with the insanity of 30-month lead times, it did not herald the dawn of true distributed processing.

The potential of the departmental machines remains largely unrealized because of the immaturity of distributed processing technology. In spite of bombastic vendor claims, the age of truly distributed processing is not here now and will not be for another 24 months or so. For this reason, IBM is analyzing and ever so subtly encouraging movement toward the two-layer topology, reminiscent of the mainframe/terminal architecture of the 1970s.

The resemblance is superficial, however. IBM's motivation is to gain even tighter account control by riding the future two-tier trend. IBM is not directly causing this shift but is early to identify its enormous potential, encourage it and attempt to capitalize on it.

Corporate users and MIS organizations alike are now recognizing that their processing requirements are well met with two distinct sets of capabilities — one reasonably formed around a multitasking micro operating environment and another formed around a robust multiprocessing mainframe operating environment.

IBM's latest mainframe additions, the S model machines of the 3090 family, formally called the Enterprise System/3090 processor units, are receiving wide acceptance in the user community. Senior management likes the performance improvements, and the granular choice of upgrade paths — no less than 67 — allows budget-sensitive users to avoid premature investment in hardware.

The most visible product used in the bid to totally recapture the MIS mind share is ESA (MVS/SP Version 3.0). With ESA, IBM delivered a master stroke.

First, this new version of the MVS operating system is proving more difficult for the plug-compatible manufacturers (PCM) such as Amdahl and NAS to analyze than anyone within those companies thought possible. The enhancements to code are proving difficult to identify, much less to support efficiently. More circuit boards are involved than anyone predicted. Prepare to give the PCMs another six months to support ESA.

Secondly, ESA in conjunction with the potential multitasking capability of OS/2 effectively leads to the solution of three corporate processing requirements:

- Provide a stable, rich applications development environment (yes, I can wait for OS/2 applications).
- Provide reliable, fast management of huge data deposits.
- Provide the muscle to manage worldwide networks.

The PCMs are substantially less of an alternative to IBM without ESA support. The combination of ESA and OS/2 reveal to corporate MIS professionals an appealing cooperative processing architecture — complete with its own IBM Systems Application Architecture label — that potentially renders the mid-range irrelevant.

IBM's own mid-range intentions place the AS/400 as the major processor for smaller companies but not a necessary level in the architecture of the large corporation.

Tasker is vice-president of International Data Corp.'s Software Research Group and IBM Advisory Service, based in Framingham, Mass.

SEVENTY BILLION LINES OF COBOL ARE A TERRIBLE THING TO WASTE.

COBOL systems dominate the world's business, with more than 70 billion lines of code. And a million experienced programmers. So why change languages when you develop for the personal computer? Why add a small step called "rewrite the whole system" to each development project? The effect on budget, schedules, standards and staff is painful—and unnecessary.

Realia offers full PC emulations of the tools you know: Realia COBOL, RealCICS, RealDL/I. With no conversion and no retraining, you can move big existing systems to the PC for development, then upload them to the mainframe—or leave them on the PC—for production.

With Realia, COBOL becomes for the PC what it has always been for the mainframe: powerful, flexible, and above all maintainable. Realia's compiler generates highly optimized machine code, with speed and compactness unmatched among PC COBOLs. You get the performance levels of Pascal or C, without the cryptic operators and the learning curve.

Realia also ends your frustration with mainframe programming utilities. Ours are fast, intuitive, full-screen and full-color. From screen manager to BMS map editor to source-level debugger, these tools eclipse anything available on the mainframe.

See for yourself. Call for a *free* 30-day evaluation.

REALIA®

10 South Riverside Plaza, Chicago, IL 60606, 312/346-0642
34 North End Road, Hammersmith, London W14 0SH, England, 01/602-8066

EDITORIAL

Mini views

IT SEEMS LIKE just yesterday that we leveled a blast at the best and brightest in the analyst community who, in their infinite wisdom, were (again) sounding the death knell for the minicomputer industry.

Minis, we were told, were the new dinosaurs, being edged out at an alarming rate by networked personal computers, which, as we all should know, were destined to rule the IS world.

Well, that *was* almost yesterday (a mere three months ago), and now see what's happening.

IBM's business is thriving, and priming the growth pump are sales of AS/400s. Hewlett-Packard is once again a recommended issue on Wall Street, because the Street likes HP's chances with its RISC-based mini lineup. And much-maligned DEC is similarly back in the Street's good graces, its recent success fueled by booming sales of its 6200 series minis.

Meanwhile, cracks are showing in the business plans of some PC makers. Apple's growth is slowing, and Wall Street is acting predictably.

So, should users assume that the LAN revolution was a ruse, that minis are rising Phoenix-like from the ashes? What next, a mainframe boom?

Instead, let's take a simpler, more consistent, balanced and long-term view of the computer business. Vendor fortunes rise and fall with their product cycles, timing and luck, not as a result of armchair prognostications. As this week's In Depth article beginning on page 45 points out, minis aren't going away; they're simply being expanded, built upon and molded into new roles.

Further, the products that sell over the long haul will be those that provide solutions. For the next few years, rest assured that product selections will feature a rich blend of PCs, mainframes and, yes, minis. Surprised? We didn't think so.

A new game

There's been some editorial changes made in our Northern California office in Burlingame, changes we feel will greatly enhance our coverage of major IS sites and computer vendors out West.

Jean Bozman, familiar to the IS community after having spent the last eight years as a computer journalist, has become bureau chief. She previously served as our Chicago bureau correspondent. Je[illegible]'s experience has resulted in superb coverage of the major IS sites throughout the Midwes[illegible], experience she now brings to her expanded ro[illegible] in the larger Burlingame office.

Also joining our team in Burlingame is Pat Waurzyniak. Pat comes to *Computerworld* from *Electronic News*. He also has worked at *Infoworld* and *Computers and Software News*.

Jean and Pat will join the existing staff of Julie Pitta and J. A. Savage in reporting on the IS and vendor communities in the western states. They can be reached at 415-347-0555.

LETTERS TO THE EDITOR

Watchdog watch

Your article "Watchdogs oppose FBI database growth" [CW, Dec. 5] contained several misleading statements. A reference to the "FBI's planned expansion" is inaccurate. The FBI is reviewing the results of a Mitre Corp. study on ways to improve National Crime Information Center (NCIC) service. Plans for system "expansion" have yet to be finalized, let alone announced.

Also, there has yet to be any evidence presented to document that a computer system threatens anyone. Only people using information inappropriately can threaten other people, whether the data is computerized or not.

You report that "two years ago the FBI announced plans to expand its central files." That is untrue. The FBI did announce a study, initiated at the request of NCIC users, to determine how NCIC services could be improved, but it has yet to act on the study's recommendations.

The suggestion that the FBI director will unilaterally announce a system expansion is misleading. Once a decision has been made on how NCIC needs to be improved, it is highly unlikely any substantive change will be made without congressional approval and funding.

When the FBI's plans are announced, I am confident they will be entirely reasonable, logical, lawful and worthy of support by the majority of Americans.

W. Gray Buckley
Chairman, NCIC
Advisory Policy Board

In his article, "Watchdogs oppose FBI database growth," James Daly depicts the FBI and users of the NCIC as intent on expanding the system into one that tramples civil rights. He says that but for the efforts of certain groups concerned with civil liberties, this might have occurred. The overall thrust of the article is wrong, and many statements are without factual basis.

This study, called NCIC 2000, was fully briefed to the Subcommittee on Civil and Constitutional Rights, chaired by Congressman Don Edwards, before it was undertaken and then again during its course. It received the Subcommittee's support, especially in the areas where we planned to insert leading-edge technology to strengthen security and privacy protections.

The unconstrained list of functions suggested by NCIC users was reduced by the NCIC Advisory Policy Board. These determinations were made by a knowledgeable board that was sensitive to individual rights. Depicting this deliberative process as reacting to ". . . objections to the scope of the expansion [which] forced [the board] to withdraw many of the controversial suggestions," impugns the integrity of board members and flies in the face of discussions that transpired during public meetings.

Likewise, the depiction of FBI Director Sessions as waiting until the Bush administration took office to announce the extent of the system's expansion is without foundation. The director's careful consideration of the issues takes place during the normal course of business, independent of which administration holds office.

Milt Ahlerich
Assistant Director
Office of Congressional and Public Affairs
U.S. Department of Justice

Another server

Your Product Spotlight [CW, Dec. 5] described the importance of distributed processing and dedicated database servers, yet did not mention Progress, which offers these capabilities. Microsoft, Ashton-Tate and Sybase's effort to develop SQL Server was mentioned instead.

Philip G. Duffy
President
Electronic Cottage Associates
West Chester, Pa.

Clone again

Douglas Barney calls the computing industry to arms to clone the Mac [CW, Dec. 19], citing its seemingly impregnable position in the market. May I suggest an alternative?

The Amiga 2000 is already available, has a Mac-like interface, is already in color, comes standard with 1M byte of memory expandable to 8M bytes, performs multitasking, dominates the microcomputer industry in graphics and sound and costs about the same as a good clone.

If you really need more extensive software, the Amiga can be configured for IBM compatibility. While the rest of the world follows IBM and Apple, those of us in the know are quietly enjoying the computer for both sides of the brain.

Dan Flasar
Clayton, Mo.

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

When to model, when to simulate

It is important to know the time and reason for each before giving your OK

BEATTA SZPURA

JOHN BARNES

The words "modeling" and "simulation" have been used almost interchangeably for a couple of decades for the perfectly good reason that a computer model and a computer simulation appear to be pretty much the same thing.

But in the last five years or so, I've noticed an emerging difference in meaning. This change is a common one, often studied in linguistics: Originally interchangeable words become used to express differences in meaning. It generally happens because some important fact is being recognized.

I suggest that in this case, although the nouns "model" and "simulation" are still close in meaning for the computer industry, the verbs "to model" and "to simulate" are coming to mean different things. Because these changes in language happen only when the new distinction is important, we ought to pay attention to the discovery it points to.

Visualize someone simulating a process. You probably think of something like an aeronautical engineer studying airflow over a wing, a city traffic manager looking at possible ways of resetting streetlights downtown or a financial officer of a bank looking at the impact of a rise in the Fed's discount rate.

Now visualize someone modeling a process. Chances are you think of things like a physicist applying basic fluid-flow equations to work up a cellular model of airflow over a wing, a traffic engineer writing matrix representations of known traffic flows and rates of change downtown or an economist working out chains of causality between Federal Reserve Board actions and impacts on the local economy.

The difference

To put it in the simplest possible terms, simulation is running software that is known to behave like the real world to find out what the real world is likely to do; modeling is creating software that behaves like the real world. Simulators use software; modelers create it.

If this distinction were all there was to it, there wouldn't be much to say. I suppose it could be a rule for who gets into the United Brotherhood of Modelers and who joins the Simulation Workers Union, but it wouldn't matter much to anyone else.

It might seem that the difference is only of interest to the ingroup of practicing modelers and simulators. But there is one subtle point that flows out of these definitions that is significant to anyone who has to deal with modeling and simulation as a manager or administrator: Nothing in the definitions says that the purpose of modeling is to produce simulations.

In the practical world, sometimes modeling is done to produce simulations, but more often it is not. In fact, it is more commonly done for its own sake.

The benefits of simulation are obvious to everyone — it's cheaper to crash things or create disasters in the simulated world than in the real one — especially since the price is figured in simulated dollars.

But if there isn't going to be a simulation coming out of it, why model? The answer is complicated, and it is important to point out that there is probably a great deal of unnecessary modeling going on for the unbusinesslike but understandable reason that modeling is a lot of fun. Quite a few of us do it as a hobby, and, ethics aside, many modelers are not above selling modeling ideas to their employers to get a fun project onto their schedules. So if someone on your staff points out that a given phenomenon can be modeled, don't assume that it should be.

On the other hand, there are some unique benefits to modeling even when it doesn't lead to simulation. A good modeler is forced foremost to learn a great deal about what he models. You may not get a simulation out of it, but you may get a genuine in-house expert. Be warned, though — the sort of knowledge a modeler gets is deep and thorough, but it comes at tremendous cost in man-hours. It might be a lot cheaper to hire consultants.

More important, modelers often find holes in the knowledge of how the existing system works. Everyone may be assuming that A leads to B, which leads to C and so forth to K. But a modeler is forced to ask, "Exactly how does G lead to H, and how do we know that? And shouldn't there be a stabilizing feedback between J and B?"

Finally, although the modeler cannot tell you for sure that his model is right when it is done, he can tell you which assumptions he started out with proved completely untenable.

Modeling tool

If you suspect that the "common sense" that "everyone knows" about something is unfounded, impossible or just plain wrong, an attempt to model may turn up a good, solid list of what you don't know. This knowledge can be a vital tool in planning research, crisis management or just plain staying out of trouble.

It may also be obvious from this that most of the information produced in modeling is not directly expressed in the final model. Enhanced understanding of a process — perhaps wisdom is the best word — usually does not reside in the model but in the modeler at the end of modeling.

Therefore, I have one final piece of advice: Unless the purpose is to produce a simulation, modeling should be farmed out as little as possible. If you must use a consultant, make sure your own people are as involved as they can be. If you can't give the job to the person who needs wisdom on the subject, give it to someone from whom he can always get advice. And if you intend to use a model to replace some part of your own decision-making process, the only safe thing to do is to build the model yourself.

Barnes is Northwest area manager of ADG, a high-tech marketing company based in San Pedro, Calif.

Irksome MIS legacy of Japan's late emperor

CHARLES P. LECHT

The recent death of Emperor Hirohito presents a monumental task to Japanese MIS for one simple reason: Dates must be changed.

Under the 2,000-year-old emperor system of monarchy in Japan, the calendar has marked the years the emperor is in power. A reign is called an era. At its inception, each reign is given a name that signifies some sloganized ideal. For example, the new emperor is Akihito, while his era is called Heisei, which means Achievement of Peace.

During the Meiji era (1868-1912), Japan adopted the Gregorian (Western) calendar but with one change: The year designation was replaced with the emperor's era and year. Thus, "Showa 64/January/" is the Japanese date for Jan. 7, 1989.

During Meiji, it was also decided that the Gregorian New Year's date of Jan. 1 would mark when an emperor's reign would change. Noting that they could not count on an emperor dying on Dec. 31 so that Year 1 of the next emperor's reign would perfectly match the Western world's year, the ever-practical Japanese decided that the new emperor's first, as well as his last, year could be a shortened one.

So, for example, the Showa era ended with the death of Hirohito on the Gregorian date of Jan. 7, 1989. Akihito then ascended the throne, and on Jan. 8, the Japanese year Heisei 1 began. The Japanese continue the tradition of honoring the emperor by making it seem as if time begins with his ascension to the throne and ends with his death.

According to a controversial Japanese law passed in 1979 called the Gengo, all official correspondence, business papers, publications, broadcast media, banking slips and so on must bear the era name and era year. So for Jan. 7 and 8, 1989, such documents are supposed to show Showa 64/01/07 and Heisei 01/01/08, respectively.

The data processing date mess created by Hirohito's death must be very annoying to MIS departments throughout the country. The event caused the diversion of as many as 10% of all Japanese DP personnel in Japan's largest companies for as much as a week to change systems to accommodate the new Heisei era dating.

Reports dated after Dec. 31, 1988, but before Jan. 8, 1989, had to show Showa 64; those starting Jan. 8 show Heisei 1. Reports spanning both dates had to contain both; there is no provision for, say, Heisei 1 minus 1.

As you can imagine, there is a massive forms redesign problem. The Japanese used preprinted Showa forms. Although it was known for some time that the emperor was dying, it was considered in bad taste, if not downright disloyal, to preprint anything that might suggest he wouldn't live forever. Besides, the name of the new era was held secret until after Hirohito died.

Now, data entry clerks, accountants, calendar makers, billing department personnel and tax people all must suddenly take into account the change of the era name and year in their printed forms.

Legislating tradition

When the 1979 Gengo law was passed, it was very controversial because Japan had become so Western-oriented. It was passed despite — or was it because of? — the fact that over the previous 15 years or so, an increasing number of governmental as well as private organizations had quietly dropped use of the era name, and some the year as well.

According to a recent survey by the *Asahi Evening News* of 52 Japanese publications displayed at the national Diet (equivalent to the U.S. Congress) library, 28 use the Western calendar, six use both and 18 use the Gengo method. Of 50 major companies polled, 27 said they abide by the Gengo law, eight use the Gregorian calendar and 15 said they use both.

The accounting systems development load in Japanese MIS organizations is particularly heavy these days. The government recently decided to impose its first post-World War II consumer sales tax, to take effect in April. In comparison to this change, the calendar problem seems minuscule.

But coming as it does during a massive work load, the calendar change especially annoys MIS management. Because of this feeling, in the Gregorian year 1989 — that is, Japan's Showa 64/Heisei 1 — large Japanese companies not already on the Gregorian calendar may well toss in the towel and silently adopt it.

Lecht is an IDG News Service correspondent based in Tokyo.

"The Data General difference: the unparalleled speed, flexibility and availability of the MV/40000. Now, it's a triple threat."

With performance ranging from 14 to over 50 million instructions per second (MIPS), Data General's new MV/40000 and MV/40000 HA (High Availability) are two of the most powerful, flexible and reliable superminicomputers ever developed.

In either uni-processor or symmetric multi-processor configurations, they provide more than twice the performance of the nearest competition at a fraction of the cost.

Our innovative Data Sharing Architecture offers outstanding flexibility for distributed computing environments. So you can incrementally expand and adapt to meet your exacting commercial or technical computing needs. The MV/40000 computers are compatible with our broad range of MV Family systems. They'll also interconnect with systems from other major vendors, to help protect your existing hardware investment.

Plus, an optional Message-Based Reliable Channel subsystem, designed for state-of-the-art maintainability, can be added to enhance system availability. It features on-line diagnostics and components that can be repaired or replaced under power, to maximize uptime.

To find out why the unique combination of speed, flexibility and availability of the MV/40000 and MV/40000 HA computers cannot be matched, send the coupon below.

Or call: 1-800-DATAGEN. In Canada, call 416-823-7830.

Data General

3400 Computer Drive, Dept. ADV/MV40/TT, Westboro, MA 01580

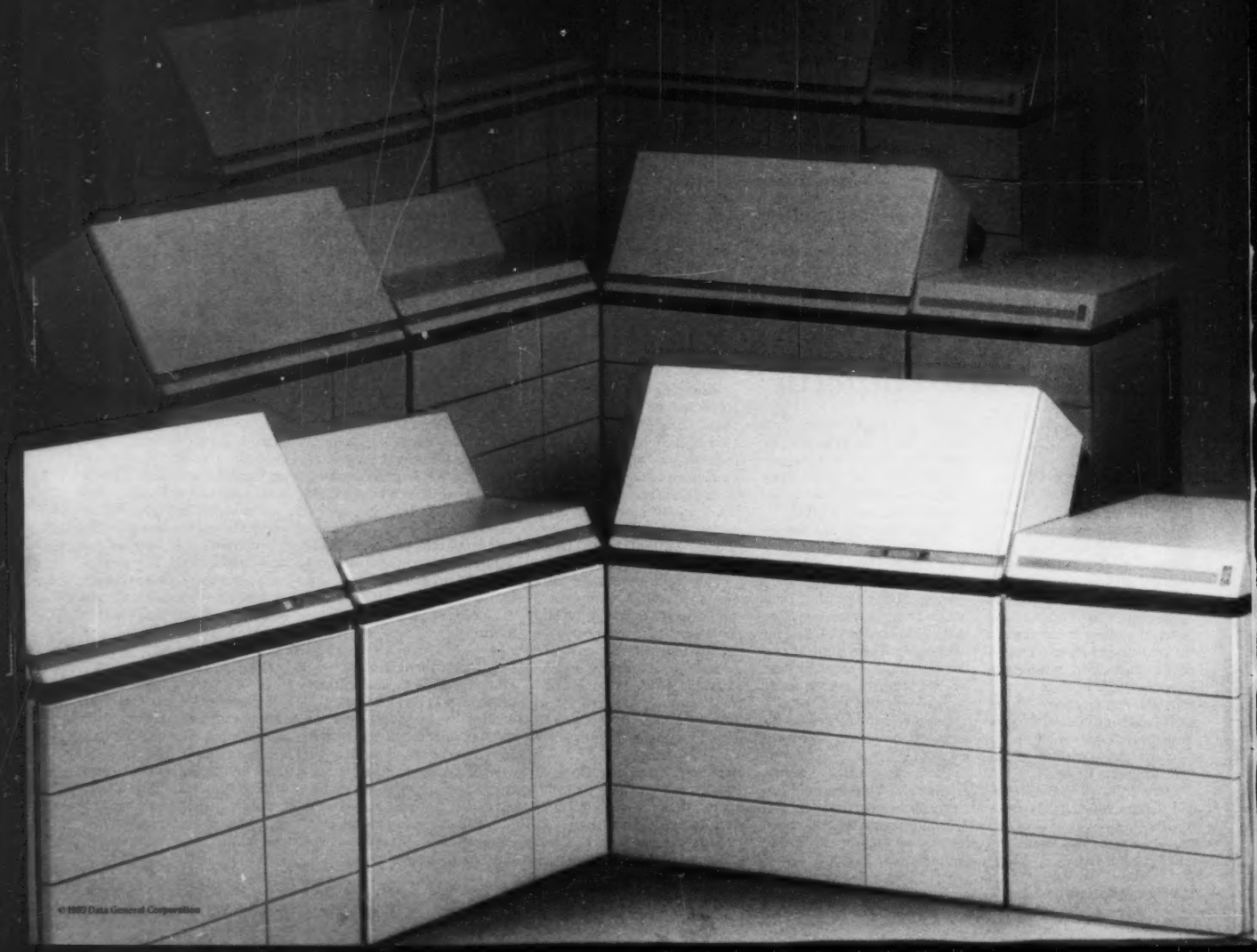
Name_____

Company_____

Address_____ Phone_____

City_____ State_____ Zip_____

CALL 1-800-DATAGEN



© 1980 Data General Corporation

SOFT TALK

Stanley Gibson

Lessons in Oracle-talk, DEC-speak

You may have been thinking it was safe to venture into the murky waters of benchmark reports and vendor claims.

It's not.

Two major vendors, Oracle and DEC, have crossed the line of straight talking — Oracle in an advertisement and DEC in a benchmark "audit."

Oracle, which has been taken to task before in this space for its misleading benchmark claims, recently ran a full-page ad in this publication that included several charts and graphs, most of which presented Oracle as No. 1 in different categories.

Oracle led off the ad claiming that it is the "world's fastest growing company." At the bottom of the accompanying illustration it states, "No other Fortune 1,000 company is growing as fast as Oracle."

With eyebrows raised, I called *Fortune* magazine in New York. They said they do not list a Fortune 1,000 as such — they stopped doing that in 1982. Instead, they compile the Industrial 500 and the Service 500. Oracle was not on either list, I was told.

In the May 1988 issue, *Fortune* ranked the fastest growing companies from both 500 list-

Continued on page 29

What will the system be worth?

There are many options for estimating residual value of new machines

ANALYSIS

BY J. A. SAVAGE
CW STAFF

When it is time to spring for a new mainframe, there are three ways to take the computer's long-term or residual value into account. Use your own wits; get a current third-party reseller, or "blue book," evaluation; or subscribe to analysts' residual-value publications.

For two recent additions to the MIS shop at Norwood, Mass.-based Analog Devices, Inc., in-house MIS consultant Joe Rocchio did his analysis on the cheap, relying on his experience and a few calls to used computer dealers. In both cases, he bought immediate gratification at a low cost rather than gamble on the resale price of a new CPU.

After weighing the cost of a used IBM 3081 Model K and a new IBM 3090, Rocchio said the residual value of the 3090 was "swamped" by the low cost of the used machine. "It's a difference of $300,000 vs. $1.7 million," he said.

On a second CPU, expected to be acquired this week, Rocchio also decided on a used system, an IBM 4381, that he said could be bought for "the cost of a few PCs these days."

For Rocchio, the choice was simple to make. But if the most up-to-date features are needed and only a new machine can satisfy the applications requirements, there is a maze of variables in guessing what the new unit will be worth several years down the line.

Unlike car shopping

Using the blue-book approach to gauging the long-term value of equipment is slightly more predictable than evaluating the resale price of used cars. Usually, the value attributed to a new machine, such as a shiny new car, has little to do with the money it brings on the used market — there are too many variables that cannot be accounted for during the interim use.

Three issues have the most impact on the eventual worth of systems: the overall economy, which is the most important and the most difficult to predict; supply and demand; and the value of secondhand IBM equipment.

Counting on such market variables is much like checking out a horse's demeanor before betting at the track, according to Russell Schneider, president of Marketex Computer Corp., a Santa Clara, Calif.-based marketer of used IBM CPUs and peripherals.

Those in the remarketing business, like Marketex, are reliable indicators of short-term residual values because they put their money on their hunches. Unlike end users, however, they have leeway to stock up or liquidate their inventories in a matter of weeks if they see supply and demand changing because of product introductions or changes in the economy.

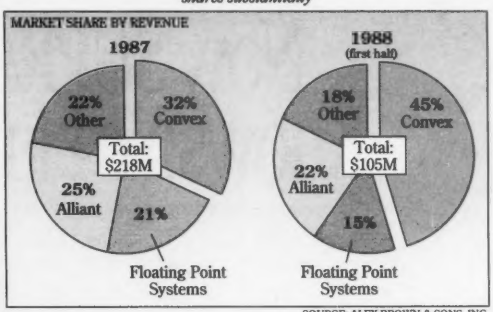
Computer pricing publications, such as those at Stamford, Conn.-based Gartner Group,

Continued on page 28

Data View

Minisuper squeeze

Convex has taken over nearly half the market, slimming competitors' shares substantially



SOURCE: ALEX BROWN & SONS, INC.
CW CHART: FRANK C. O'CONNELL

DEC desktop software proves memory-hungry

BY AMY CORTESE
CW STAFF

Digital Equipment Corp.'s recent desktop rollout may mean more functionality for DEC customers, but at what price? To run Decwindows applications, users should be prepared to beef up their storage, DEC officials acknowledged at the announcement.

When pressed about memory required to run VMS 5.1 — the DEC release containing Decwindows — company officials revealed that although 4M bytes was the rock-bottom memory requirement, performance will be best with 8M bytes on the desk top.

There are three tiers of memory requirements, according to Rick Spitz, DEC's manager of VMS engineering. A minimum of 4M bytes is necessary for a workstation to run VMS 5.1 with Decnet, and then applications can only be executed remotely. With 6M bytes, a workstation can run VMS 5.1 in a DEC VAX cluster. However, for large applications and "ideal performance," DEC recommends 8M bytes, Spitz said.

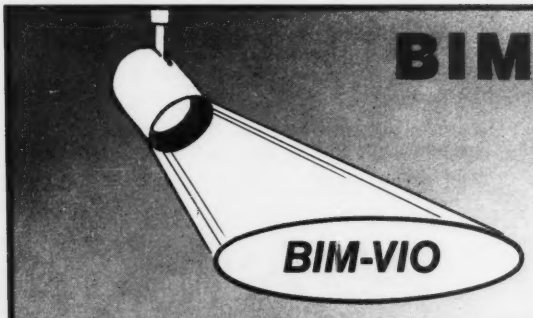
In comparison, when running VMS 5.1 as a maintenance update without using Decwindows, the memory requirements are less — around 4M or 6M bytes, he said.

The minimum storage is adequate to run Decwindows, Spitz said, but many users will want to add more, especially to run large applications or many concurrent applications.

Continued on page 28

Inside

- Manufacturing system brings Litton Systems out of the mainframe world. Page 25.
- Jupiter enhances view of display subsystems. Page 30.



BIM Spotlight

PROBLEMS: *The DOS/VSE Label Area is a performance bottleneck. Slow disk, relative to CPU, limits performance.*

SOLUTION: *BIM-VIO–The DOS/VSE 'VIRTUAL' Disk Drive and Resident Label Area Product.*

BIM-VIO creates a "Virtual" Disk Drive in the VIO area of DOS/VSE/SP. Since this area is in virtual storage, references to it are satisfied at CPU speeds and no actual disk I/O takes place. The net result is a potentially significant performance improvement of programs using disk files that have been moved to this area.

A built-in feature of the product is that the DOS/VSE Label Area is relocated to the virtual disk. This area is one of the most frequently accessed in most DOS sites, so moving it to the virtual disk should result in significant performance improvement to the overall system, regardless of any other specific use of the virtual disk capability.

Call for full documentation or free 30-day trial. Price: $3600, $1800/yr, or $180/mo.

BIM has over 20 system software products for improving productivity and use of DOS/VSE, OS, and CICS, and also performs systems programming consulting. Marketing agents in most countries.

BIM — BI MOYLE ASSOCIATES, INC.
5788 Lincoln Drive
Minneapolis, MN 55436
612-933-2885
Telex 297 893 (BIM UR)
Member Independent Computer Consultants Assn.

Now SUPRA®
Knows No Limits.
SUPRA Version 2: Everything you've always wanted. And more.
SUPRA Version 2: The only SQL, advanced relational DBMS that removes the boundaries between IBM,® VAX,™ and UNIX® platforms–giving you the foundation you need for a totally distributed environment.
SUPRA Version 2: Unsurpassed ease of use, performance, and automatic integrity enforcement through its unique Three Schema Architecture–meaning functionality and control for your entire organization.
SUPRA Version 2: World-class advanced relational technology with significant SQL extensions and integrated CASE tools–providing a comprehensive relational productivity environment that enables you to use information as a strategic resource.
SUPRA Version 2: Commitment to international ANSI/ISO standards with SQL. Call today for more information and a demonstration.
1-800-543-3010
In Ohio, 513-661-6000 • In Canada, 1-800-387-5914
CINCOM
The Better The Solution, The Better The Value℠
digital
DEXPO EAST '89
Visit us at booth 644

HARD TALK

J. A. Savage

New life for NAS

Surprising even those with the clearest of crystal balls, Memorex Telex N.V., not Hitachi Ltd., was the highest bidder for National Advanced Systems. Memorex Telex agreed to take half of NAS from National Semiconductor early this month, with an option to purchase NAS' remaining stock at a later date.

This partial sale doesn't rule out some interest from Hitachi, which had been widely rumored to be NAS' suitor and which provides — and will continue to provide — NAS' CPUs and storage devices. That remaining 50% doesn't necessarily have to be bought by Memorex Telex; it could be slurped up by Hitachi with Memorex Telex's blessing, in a deal not unlike that of Fujitsu's partial ownership of NAS rival Amdahl.

With the Memorex Telex interest, NAS users are likely to see some minor changes in a relatively short time. NAS will be its own company for a change. It won't be entirely beholden to National Semiconductor, either, for a stake of its profits or for a decision-making chain of command.

A NAS that is quicker to respond to customers' needs and that will have more of its own money to spend on marketing and research and development is likely to result. While NAS

Continued on page 29

Litton downsizes to AS/400

Competition leaves Unisys in the slow lane, IBM in the winner's circle

ON SITE

BY ROSEMARY HAMILTON
CW STAFF

SPRINGFIELD, Mo. — Earlier this month, the information systems department at Litton Systems, Inc.'s Advanced Circuitry Division turned on its IBM Application System/400 Model B40 and brought its mainframe era to an end.

For more than a decade, the company had relied on small Unisys Corp. mainframes. But when the company decided to implement a fully integrated manufacturing system in 1987, it also decided it was time to take a look outside its mainframe world, according to Paul Hoyt, manager of IS.

The company, which makes printed-circuit boards, had purchased its first mainframe in 1977, buying a Sperry Corp. 90/60. According to Hoyt, Litton stayed with the mainframe and its subsequent upgrades because it was what it knew best.

Resistance to change

For years, the company rejected the idea of any big system change. But when it chose to go with a full suite of manufacturing programs, it decided to look for the best system available, whatever the platform.

"I think the people at Unisys thought it was a Unisys vs. IBM decision," Hoyt said. "That was only about 30% of it. We looked for the software first. That drove the hardware decision."

Hoyt said a committee made up of department managers was put together to review manufacturing systems. A total of 20 systems, all minicomputer-based, were given a first look.

While reviewing other vendors' packages, Litton also considered the option of sticking with what it had and adding software modules. The company was running a Unisys 1100/71 with Unisys' Unis manufacturing software, but it was not running the full suite of applications.

The list of systems was cut in half, and by May 1988 the committee had narrowed it down to two: the additional Unisys Unis modules running on the company's current system or a manufacturing package from Data 3 Systems, Inc. running on an IBM AS/400.

Price not a factor

When the committee announced its two finalists, Hoyt said he thought the minicomputer option would score big points against the mainframe contender because of its cheaper price. However, when Unisys factored in a number of discounts, the prices were not that different.

Hoyt estimated that during the next eight years, he would have needed a $9 million budget to run the Unisys system and $6 million for the AS/400 system.

Hoyt said the AS/400 package proved superior to the Unisys challenger primarily because it was less complex. "It was their intuitive approach to manufacturing," Hoyt said. "The data was just more accessible and the system was easier to use."

Ease of use is a big factor in Hoyt's department, which totals nine. "We were simply not able to serve the company the way we wanted to," he said. "With such a complex system as any mainframe is, you spend a lot of time on system overhead, time you could be putting toward useful work for the company."

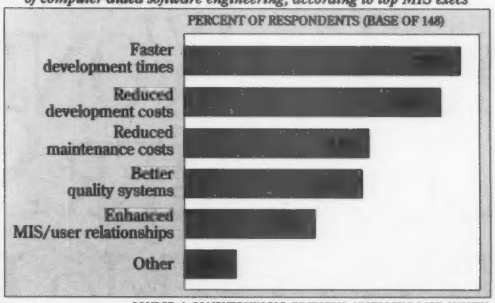
Hoyt said the small staff has its work cut out for it. Turning

Continued on page 28

Data View

Primary benefits of CASE

Improved development times and costs are the most important advantages of computer-aided software engineering, according to top MIS execs



SOURCE: A *COMPUTERWORLD* EDITORIAL ADVISORY BOARD SURVEY
CW CHART: JOHN YORK

SOFT NOTES

Empress extends to Solbourne

Empress Software, Inc. in Greenbelt, Md., said Empress, its relational database management system that runs on Sun Microsystems, Inc. workstations, will also run on Solbourne Computer, Inc.'s Series 4 workstations.

The Solbourne workstations, like Sun's, use Sun's Scalable Processor Architecture, a reduced instruction set computing chip.

Solbourne used Empress to verify compatibility between the two workstations, Empress said. Solbourne, based in Longmont, Colo., has formed a strategic alliance with Matsushita Electric Co. in Osaka, Japan, for development of the workstation.

Cognos, Inc. in Ottawa, Ont., a supplier of application development tools, said it plans to provide application development tools for IBM's Application System/400. The firm provides tools for use under Microsoft Corp.'s MS-DOS and OS/2 and has said it will offer its tools on IBM mainframes. The company said it plans to offer a solution compliant with IBM Systems Application Architecture on all strategic IBM platforms.

Biin in Hillsboro, Ore., said its Ada compiler had been validated under Ada Compiler Validation Capability Version 1.10. Such validation is required before an Ada compiler can be used in a U.S. Department of Defense application. The Ada compiler runs on the Biin 20 and Biin 60. The processors run Biin/OS.

► IBM 3270 and System/3X Users:

100% IBM 4224 Compatible!

► Available Now!

With the plug-compatible ISI 7224, you can print everything an IBM 4224 can print . . . and more.

7224

Speeds reach 400 cps draft. You can also print graphics, bar codes, and oversize characters without GDDM, BGU, or other special software. Output can be in black or up to eight colors.

Fully integrated (no box!), the ISI 7224 connects directly to IBM 3174/3274/3276 controllers or S/3X twinaxial cable.

Forms-handling advantages include automatic paper parking, no-waste demand-document tear-off, and a straight path for stiff forms. No extra-cost gadgets are required.

Extra features and all, the ISI 7224 costs much less than its IBM counterpart.

For more information, call **1-800-544-4072** (in Michigan, 313/769-5900). Or write.

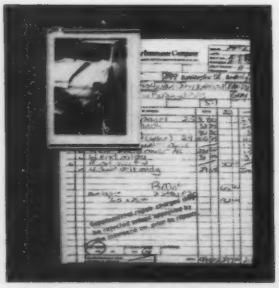
Interface Systems, Inc.

Printer Solutions for IBM Systems

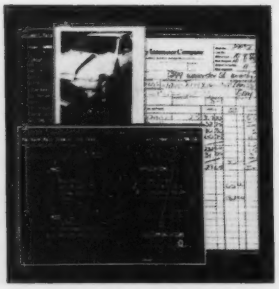
5855 Interface Drive, Ann Arbor, MI 48103
Telex: 810-223-6058

► The ISI 7224 prints at 53.7 dBA — quieter than the IBM 4224. And since it's only seven inches tall, it fits tighter spaces.

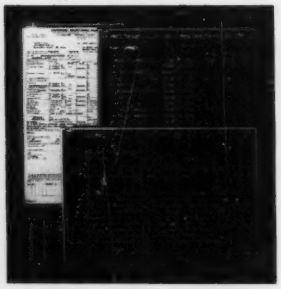
A BETTER IMAGE CAN DO WONDERS FOR CUSTOMER SERVICE. AND THAT'S NO IDLE CLAIM.



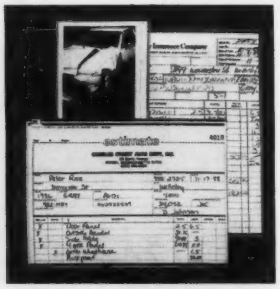
There's a fender bender on a freeway. The adjuster comes out and takes a picture of the damage. And signs off on an adjustment.



The handwritten document and the photo – the images – both go back to the home office via electronic mail.



Touch a button and you have a data window, a text window, an image window right in front of you. Presto!



A guy in the field wants to verify the estimate. Click! The adjuster's handwritten report, the estimate, and the photo are right there on the screen.

Actual Wang computer screens shown here.

Claims processing.

Until now, it's been pretty much a hit or miss affair. Waiting for documents, verifying estimates. Signing off adjustments.

But with Wang's Integrated Image System, you can process an accident claim in a fraction of the time.

INTEGRATED IMAGING

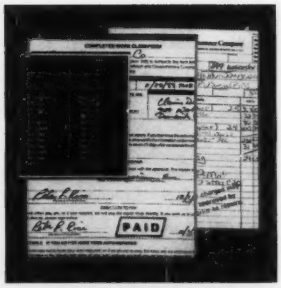
WIIS gives your people immediate access to the information they need, where and when they need it. In the office or in the field.

With the press of a button up comes an image window, text window, data window. Simultaneously. And it's integrated information. With your FAX machine. Your electronic mail. Your company's computer system.

Wang's Integrated Image System.

What it can do for your image it can do for your customer service.

And that's no accident.



The entire claim processed in half the time.
That's Integrated Imaging and Wang has it!

WANG

MAKES IT WORK

For more information, contact your local Wang Sales Office.
Or write Wang Laboratories, Attn: Inquiry Service, M.S. 014-03C, One Industrial Avenue, Lowell, MA 01851. © 1989 Wang Laboratories, Inc.

Worth

CONTINUED FROM PAGE 23

Inc. and Framingham, Mass.-based IDC Financial Services Corp., predict long-term equipment values based on mathematical models and human insight but do not risk money on their predictions.

Schneider likens such financial publications to tip sheets at the racetrack. "If I didn't know anything about the track, I would be the first to buy a tip sheet. But if I was a regular player, I wouldn't need it," he said.

While users could get by cheaply by picking the brains of remarketers, reports from financial services are a near necessity, not only for convincing a corporate treasurer that a particular machine is worth the price but also for offering a reasonable assurance of what it will be worth in the future. It also helps to have someone else to blame if the predictions are incorrect.

Gartner bases its model on understanding vendors' strategies, according to Vice-President Jann-Marie Halvorsen. The company also models rates of change in price/performance and supply and demand in a product's market. Gartner's staff adds its theories of what will happen to equipment in terms of anticipated price cuts, mid-life kickers, competing products and functional differentiation.

IDC uses much of the same information as Gartner but adds user feedback in assessing products, according to analyst Frank Gens.

The simple equation of supply and demand is at the core of IDC's predictions, Gens said, but the black art of guessing the nation's economy can skew even the best-researched predictions. "For instance, in the last year, fair market values dropped more quickly than anyone predicted," he said. This drop indicated that one of the largest industry sectors, the financial sector, had a recession in 1988; thus, it was tougher to sell mainframes, he said.

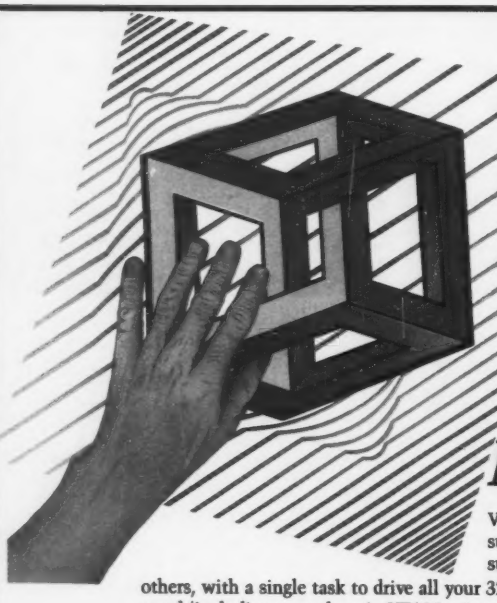
Both companies offer long-term residual market-value forecasting. The firms rely on huge amounts of data to follow trends and predict the economy's performance.

The numbers offered by those services tend to be conservative, but they get sharper as the equipment ages, according to Charlie Berry, president of Berry Computer, Inc., an Apple Valley, Minn., remarketer of Amdahl Corp. equipment.

A third pricing publication straddles the gap between remarketers and mathematical modelers. "Computer Price Watch" is put out by Dale Taylor, president of Computer Information Resources, Inc. in Arlington, Texas. Taylor said he polls dealers and brokers around the country to reach a consensus on wholesale and retail prices of used equipment as well as prices of leased equipment.

"I try to be like an automobile blue book," Taylor said. He does not try to predict residual values; instead, his service is meant to be used by someone shopping for a used machine who needs guidance on reasonable prices.

Just like the new mainframe market, the price of IBM equipment dictates what used prices will be, according to remarketers. "Equipment moves on a bar chart in lockstep with IBM, with the same price/performance ratio in the new market as the used market," Berry said.



VPS
Support
Of Network
Printers On
MVS Is A
Complex Task
Made Simple.

VPS has been used to replace other products, such as: IBM's 328x/ADMPRINT/DSPrint, CICS supported printing, SASWTR®, RJE and many others, with a single task to drive all your 3270 family printers directly from the JES spool (including cross domain VTAM printers).

1700 Sites use VPS as their shop standard 3270 family printer driver.

- Printers supported include the full array of 3174/3274 attached printers, including IPDS support for 42×4's, HP and Xerox lasers, plotters and PC printers.
- VPS runs as a VTAM application. NO system modifications. NO JES maintenance.
- Automatic forms control, full FCB support, dial-up PC printers, printer pooling and "hot" printers are all supported.
- Full screen "ISPF-like" command interfaces for CICS, TSO and ROSCOE® permit end-user control of printers with totally menu driven command entry.

CALL or write for more information, or to arrange for a free TRIAL – ATTN: Marketing Dept.

In Western Europe:

S.E. SOFTWARE B.V.

Contact: R. Mann
S.E. SOFTWARE bv ◆ Treubstraat 1, 2288 EG Rijswijk, Nederland
Tel. 31-70-90 76 83. Telex 31117. Telefax 31-70-95 42 24

In the United States and other countries:

LRS Levi, Ray & Shoup, Inc.

Specializing in Computer Systems Software
2387 West Monroe
Springfield, Illinois 62704
(217) 793-3800 ◆ Telex (510) 60-00675

®SASWTR is a registered trademark of SAS Institute, Inc., Cary, NC.
®ROSCOE is a registered trademark of Applied Data Research, Inc.

DEC desktop

CONTINUED FROM PAGE 23

In fact, it appears most customers will probably need more memory if they want to run applications, particularly storage-intensive ones that use DEC's Compound Document Architecture.

For instance, DEC literature states that to be able to operate Decwrite and VMS 5.1, Vaxstations should be configured with a minimum of 8M to 12M bytes of memory. Decwrite, the compound document editor, is one of two new software applications that offer the "live link" capability.

Although the price of memory has come down, "the cost could be significant for the low-end user," said Steve Widen, an analyst at Technology Financial Corp. Widen explained that by the time a customer spends $2,000 on additional memory for a $10,000 workstation, the cost is up to 20% of that of the workstation.

All of the new DEC workstations come with 8M bytes or more of standard memory, but there are many customers with Vaxstation 2000s and other workstations with 4M bytes or less.

Litton

CONTINUED FROM PAGE 25

on the switch earlier this month was the easy part. A one-year conversion project comes next, during which the Unisys and IBM systems will be operating in parallel. The plan is to slowly bring the Data 3 Systems applications on-line, which will give users the chance to adapt to the new machine while still having the older system to rely on.

Hoyt said he hopes to get rid of the mainframe in November. Most of the Unisys software will be discarded at that time, he added.

The initial reaction to the IBM minicomputer has been positive, Hoyt said. IS has the backing of all department heads, and their support of the conversion trickles down to other users, which lessens resistance some may feel about the change, he added.

Gibson

CONTINUED FROM PAGE 23

ings. Reebok International Ltd. led the list. In addition, *Fortune's* listings are only for U.S. companies, and thus, even if Oracle were included in them, it could make no global claim.

Oracle also printed several benchmark results, including 265 transaction/sec. on an IBM 3090 running Oracle under MVS. Under the bar chart, it reads, "Audited benchmark results are available on request."

But not for those 265 transaction/sec., it turns out.

Oracle's response? "We stand by the ad," said Peter Tierney, vice-president of marketing.

The ad contained other doubtful claims — but enough; on to DEC.

Last week, DEC released a portion of its audited benchmark report — the one that is supposed to contain substantiating information on the results DEC first released in July 1988. This is the first installment of the report that was promised for October 1988 but was not delivered then.

Not only was the booklet only a partial listing of what was tested (DEC's 3600, 6200 and 8800 models), the results of the 8800 models weren't even audited.

Also, there is a difference between the tested and priced 8800 systems. The 8800s were tested with 256M bytes of memory but priced as if they had only 128M bytes.

Ridiculous!

If you went to an auto dealer and asked for acceleration figures for the four-cylinder model on which you were being quoted a price, and the dealer pulled out the zero-to-60 figures for a souped-up V-8, would you cry foul? Of course you would. One can only hope that the rest of the report, which DEC says it will release soon, stands up to closer scrutiny.

Omri Serlin, head of Itom International, Inc. and chairman of the Transaction Processing Performance Council (TPC), of which both DEC and Oracle are members, says he is waiting eagerly for the results of DEC's tests on IBM's 9370 Model 90.

IBM has released an audited report that shows the model performs three times faster than DEC's results showed. The IBM results also present a five-year cost of ownership that is considerably less than DEC claimed. Both IBM and DEC are testing, ostensibly, according to Debit/Credit guidelines, which Serlin and the TPC are trying to develop into standards. IBM is also a member of the TPC.

If there is still a discrepancy after DEC releases its figures, "then we have a clear deficiency in the test," Serlin says.

Gibson is *Computerworld's* senior editor, software.

Savage

CONTINUED FROM PAGE 25

won't have big daddy National Semi to bail it out when an IBM move wipes out the company's orders in the short term; it also won't see all of its profits being funneled to National Semi when the semiconductor business puts a strain on the corporate wallet.

What Memorex Telex gets out of the deal is NAS' ability to provide CPUs. Thus, Memorex Telex becomes the first company outside of IBM to offer end users a soup-to-nuts product line.

Memorex Telex also will get a stronger U.S. presence and, perhaps eventually, a chance to replace its high-end storage device line — which has a tarnished reputation — with NAS' (Hitachi's) devices, which are well respected, according to analyst Louise Biggs at Dataquest.

Memorex has been the weaker of the Memorex Telex duo since they merged in early 1988, said Biggs, who spent 12 years working for Memorex.

Biggs said that NAS will lend stability to the company's U.S. operations. London-based European operations have been run by a management less prone to turnover. "Many end users have written Memorex Telex off. They're tired of listening to the company's changes and don't understand that now there are fundamental changes in the level of commitment by the [European] management," he said.

With NAS to shore up Memorex Telex's U.S. reputation, both companies get some domestic benefit.

Still unknown

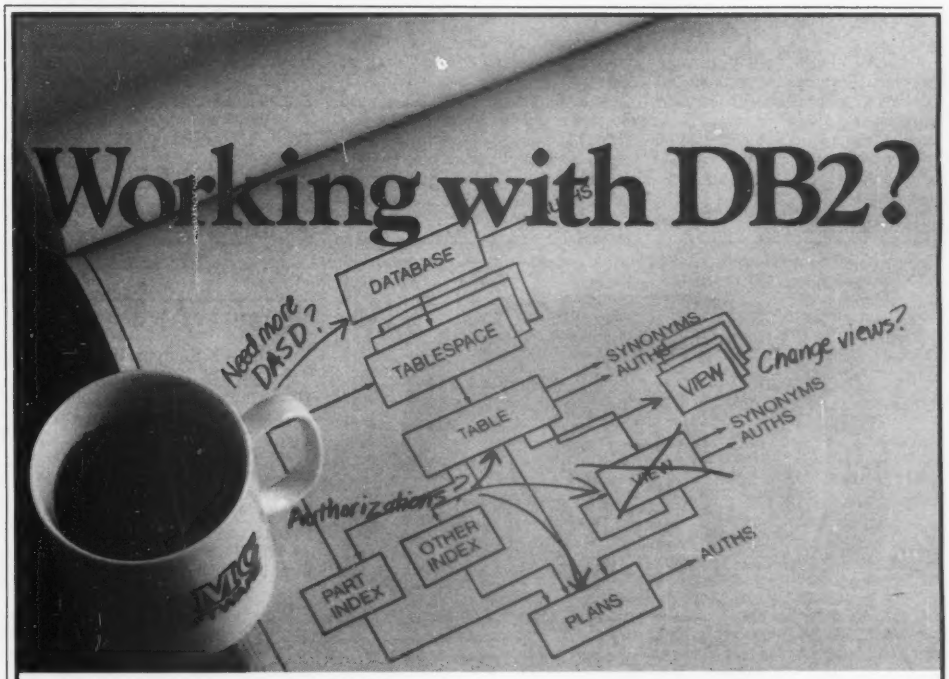
Memorex Telex could conceivably compete with NAS in high-end storage systems. It currently serves as an OEM for several sources, including Fujitsu, for its direct-access storage devices (DASD). Fujitsu owns 49% of NAS' rival Amdahl and supplies DASD to Amdahl specs.

Analysts don't expect Memorex Telex to give up its Fujitsu contract. In fact, Memorex Telex still plans to ship its version of IBM's J and K storage subsystems this spring, as NAS already is doing in that market, according to Biggs.

It is very likely that the two organizations' storage products could coexist but that their field operations would then overlap.

Secondly, the way that the buyout is financed could affect NAS' operations. If the financing is based on immediate performance from NAS, it could constrict the economic breathing space NAS is allowed after the deal.

Savage is a *Computerworld* West Coast correspondent.



Work with BMC

DB2 can be a lot more work than you expected with quite a bit less help than you need. But when you've got BMC Software's comprehensive set of data base administration tools—which include standard interfaces and integrated function—you can reduce your costs and make your work fast, easy and error-free.

DB2 ALTER—provides complete support for changing, copying and migrating DB2 data structures; includes data conversions, authorization-id switching and restart capabilities.

DB2 CATALOG MANAGER—gives quick and easy catalog information, execution of SQL DDL and DB2 utilities, audit logs and extended SQL function.

DB2 DASD MANAGER—controls the life cycle of physical objects with comprehensive space analysis statistics; also includes space estimation, AMS command and utility jobstream generation and action triggers.

DATA PACKER™/DB2—reduces DASD requirements for DB2 tables an average of 30% to 70%; reduces EXCPs.

DB2 REORG PLUS—reorganizes DB2 tables significantly faster than the supplied DB2 utility; provides dual image copy and statistical history.

© 1989 BMC Software, Inc. All rights reserved.

For more information or to begin a 30-Day-Plus Free Trial of any or all of these products, complete and return this coupon or call BMC Software, Inc., **The Complete DB2 Company.™**

In the U.S. and Canada: **1-800-841-2031**
In Texas, call collect: 713-240-8800
France (16-1) 48 77 77 77
Italy (02) 48193845
Japan (03) 837-8651
United Kingdom (0276) 24622
West Germany (069) 664060

BMC Software, Inc.
P.O. Box 2002
Sugar Land, TX 77487-2002
1-800-841-2031

BMC SOFTWARE

Contact me about:

Free Trial	More Info	
☐	☐	DB2 ALTER
☐	☐	DB2 CATALOG MANAGER
☐	☐	DB2 DASD MANAGER
☐	☐	DATA PACKER™/DB2
☐	☐	DB2 REORG PLUS
☐	☐	All BMC DB2 products

Name _____
Title _____
Company _____
Address _____
City _____ State/Prov. _____ Zip/P.C. _____
Phone _____
CW

NEW PRODUCTS — SYSTEMS

Processors

A system developed specifically for networked Apple Computer, Inc. Macintosh computers has been announced by **Human Designs, Inc.**

Dubbed **Chorus**, the floor-standing unit reportedly can contain up to 16 floating-point processors and connects to networked Macintoshes to create a multiuser desktop environment.

The product offers performance of eight million to 32 million floating-point operations per second and was designed to accommodate software development, according to the vendor. Options include an Ethernet I/O upgrade and a software simulator.

A Chorus 1 single floating-point processor entry-level system costs $9,700. A Chorus 4 configuration with four floating point processors is available at $25,000, which includes a dedicated I/O processor with an Apple Appletalk port and system software. Both systems are upgradable.

Human Designs, 322 W. 71st St., New York, N.Y. 10023. 212-580-0257.

Pansophic Systems, Inc. has released **Studio Works 3.1**, a graphics workstation capable of producing 35mm slides, video animation, hard copy and color prepress.

The product has been modified to offer support for Truevision's ATVista graphics board with a built-in Texas Instruments, Inc. 34010 coprocessor and also provides scanning capabilities at 300 dot/in., the vendor said.

The workstation is priced at $39,900 for an Intel Corp. 80286-based system and $47,900 for an Intel 80386-based configuration.

Pansophic, 2400 Cabot Drive, Lisle, Ill. 60532. 312-505-6000.

Paracom, Inc. has announced its **MTM-Sun/SP** Transputer-based motherboard.

The Motorola, Inc. VMEbus-compatible card reportedly allows Sun Microsystems, Inc. users to utilize the board as a coprocessor in a host machine or transform the Sun system into a front end for large, external parallel processing structures. It incorporates a 64- by 64-serial channel Network Configuration Unit to allow total software configurability of the processor topology, the vendor said.

The MTM-Sun/XP is priced from $12,895; quantity discounts are available.

Paracom, Building 9, Unit 60, 245 W. Roosevelt Road, W. Chicago, Ill. 60185. 312-293-9500.

Data storage

Jupiter Systems, Inc. has enhanced its Satellite and J-Station display subsystems with the introduction of an **extra-large frame buffer memory option.**

According to the vendor, the higher memory permits images with up to 5,120 pixels by 4,096 lines to be stored and allows large-image viewing and film-loop animation techniques. The Satellite operates in a Sun Microsystems, Inc. workstation environment; the J-Station was developed for Digital Equipment Corp.'s Microvax II computer.

The subsystems are priced from $40,000 to $80,000.

Jupiter Systems, 1100 Marina Village Pkwy., Alameda, Calif. 94501. 415-523-9000.

NEW PRODUCTS — SOFTWARE

System software

The **Digital Equipment Computer Users Society (DECUS)** has released a directory management tool from its library that offers public domain software for DEC computer users.

Directory Scan Version 1.8 is said to be written entirely in the new VAXTPU language that is distributed with every VMS and MicroVMS system. The directory is immediately available for the VAX/VMS operating system and is priced at $37. The product is shipped on a 600-ft tape at 1,600 bit/in.

DECUS, U.S. Chapter, 219 Boston Post Road, Marlboro, Mass. 01752. 508-480-3418.

Computer Associates International, Inc. has announced **Release 5.0** of **CA-Duo**, the company's transition system software product for VSE under MVS.

The most recent version allows VSE compilers to access MVS partitioned data sets, providing data center managers with uniform MVS procedures and controls over program management of VSE applications, according to the vendor.

CA-Duo 5.0 is priced from $10,980 to $40,000, depending on the length of lease.

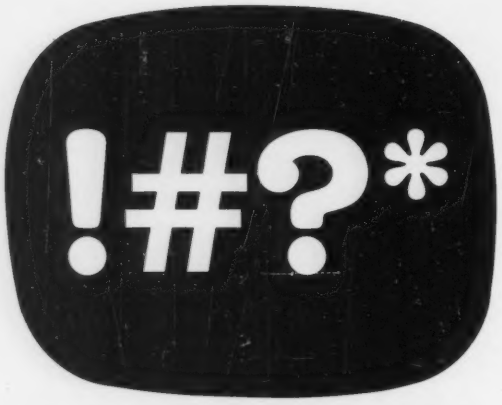
CA, 711 Stewart Ave., Garden City, N.Y. 11530. 516-227-3300.

Tower Systems International recently released an enhanced version of **EPIC/VSE,** its integrated tape and disk management system.

According to the vendor, the system controls all aspects of storage media resources. **Release 2.2** reportedly includes enhanced reblocking functions, tape pool definitions and tape vaulting by sequence number.

Depending on CPU group, EPIC/VSE is priced from $8,000 to $29,000, the vendor said.

Tower Systems, 2220 Fairview Road, Costa Mesa, Calif. 92627. 800-854-7551.



TO MOST PROGRAMMERS, TEST IS A FOUR-LETTER WORD.

Everyone knows that software testing isn't a job that inspires kind words. In fact, even the most patient programmers and users have been known to spout strings of expletives when facing endless testing tedium.

But now you can clean up your act (and your testing) with TRAPS.® The revolutionary PC-based Testing/Recording And Playback System that increases testing productivity by up to 800%.

TRAPS automatically detects and captures mismatches in data, cursor positioning and attribute bytes – without the need for coding test scripts. With TRAPS, even the smallest discrepancies are identified and isolated – before they cause problems in production systems.

TRAPS. The Testing/Recording And Playback System you can swear by. Not at.

For more information or a demonstration of our completely automated acceptance and regression testing tool, call us at 1-203-277-9595.

TRAVTECH Inc.

One of The Travelers Companies, One Tower Square, Hartford, Connecticut 06183

TRAPS is a registered trademark of TRAVTECH, Inc.

Sign up now... for the FREE INGRES seminar in your area.

Reservations are going fast! Make sure you have a seat at our FREE seminar. To register, check the location and date of the seminar nearest you, then call us toll free, in the U.S. and Canada, at:

1-800-4-INGRES
(1-800-446-4737)

U.S. SEMINARS

CA	Los Angeles	Feb. 8
		Mar. 14
	San Francisco	Feb. 9
	San Diego	Feb. 14
	San Jose	Feb. 7
		Mar. 15
CO	Denver	Feb. 8
CT	Hartford	Feb. 22
DC	Washington	Feb. 9
		Feb. 17
		Mar. 22
GA	Atlanta	Feb. 7
IL	Chicago	Feb. 2
		Mar. 23
IN	Indianapolis	Mar. 14
MA	Burlington	Mar. 23
	Cambridge	Feb. 2
MI	Detroit	Feb. 21
MN	Minneapolis	Feb. 15
MO	Kansas City	Feb. 23
	St. Louis	Feb. 16
NC	Raleigh	Feb. 23
NJ	Princetown	Feb. 14
	Saddle Brook	Feb. 8
NY	Albany	Feb. 15
	New York City	Feb. 21
OH	Cincinnati	Mar. 23
	Cleveland	Mar. 8
OK	Tulsa	Feb. 9
OR	Portland	Feb. 22
PA	Philadelphia	Mar. 23
	Pittsburgh	Mar. 8
TX	Dallas	Feb. 7
	Houston	Feb. 14
UT	Salt Lake City	Feb. 16
WA	Seattle	Mar. 14
WI	Milwaukee	Feb. 16

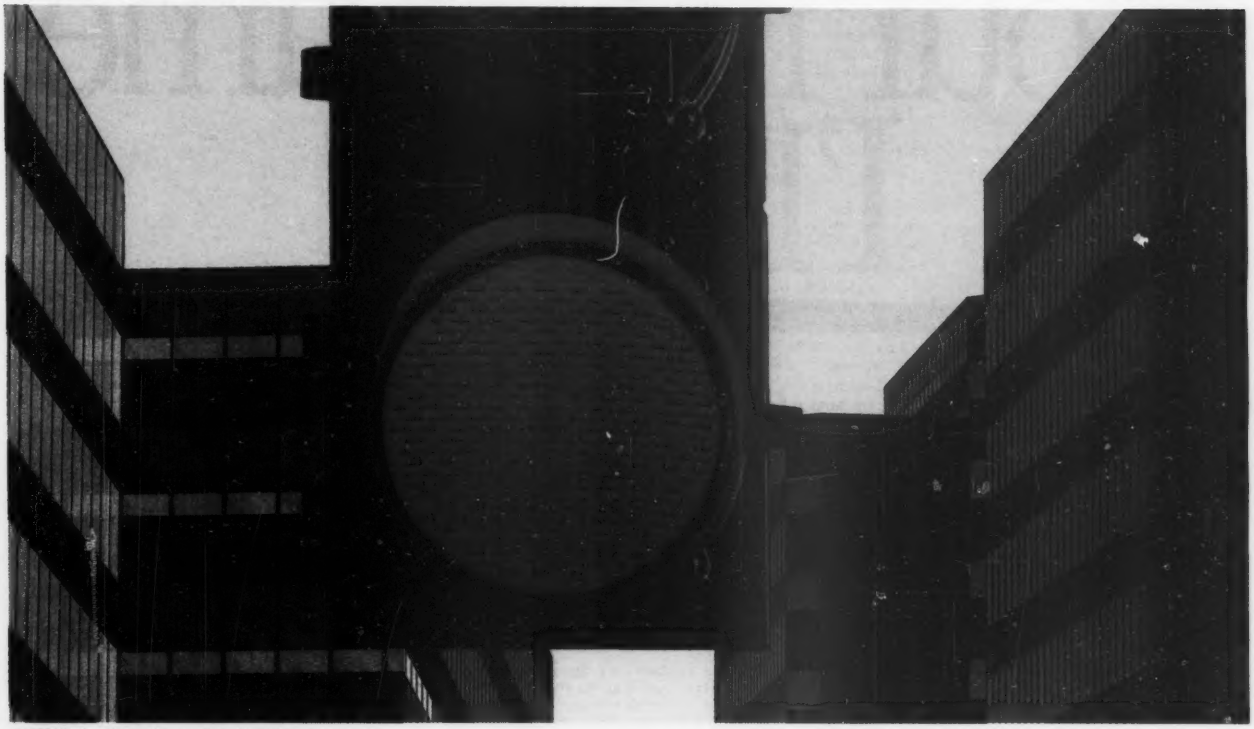
CANADIAN SEMINARS

ALB	Calgary	Mar. 14
BC	Vancouver	Feb. 7
ONT	Ottawa	Mar. 9
	Toronto	Feb. 9
		Mar. 21
QUE	Montreal	Feb. 2
	Quebec City	Mar. 8

INGRES
RELATIONAL TECHNOLOGY

1080 Marina Village Parkway
Alameda, CA 94501

Direct Access To All Your Data With INGRES Relational Database.



©1988 Relational Technology Inc. Printed in U.S.A.

Access. Whether you have dissimilar hardware, data locked in existing databases, or branch offices halfway around the world, your business depends on its data resources. INGRES combines the Tools, Power, and Access you need to turn your data into a more powerful business resource.

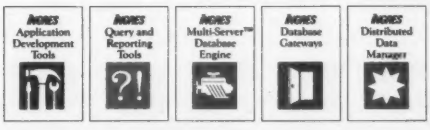
Tools INGRES offers an unmatched integrated application development environment providing CASE, 4GL, SQL and visual programming methods. Applications are instantly portable across multiple business locations and hardware platforms. This cuts development time and gives all your users access to your company's vital business applications and information.

Power The INGRES high performance SQL database engine provides OLTP power to support production applications in single or multi-CPU and distributed environments. A unique AI-based query optimizer maximizes processing efficiency to keep traffic flowing smoothly.

Access Only INGRES integrates existing data into your applications through flexible access tools. Gateway access to existing data. Network access to tie your systems together. The most advanced distributed technology to integrate islands of information. Access to your data wherever it resides.

Find out how your company can have direct "green light" access to data wherever it resides—like thousands of companies worldwide—with INGRES. Attend a free INGRES seminar.

Call 1-800-4-INGRES



INGRES
RELATIONAL TECHNOLOGY

Corporate Headquarters: 1080 Marina Village Parkway, Alameda, CA 94501, (415) 769-1400
International Headquarters: Anchor House, 15-19 Britten Street, London SW3 3TY, UK, + 44 1 351 7722 CW

"If that came out of our mainframe, I'll eat it."

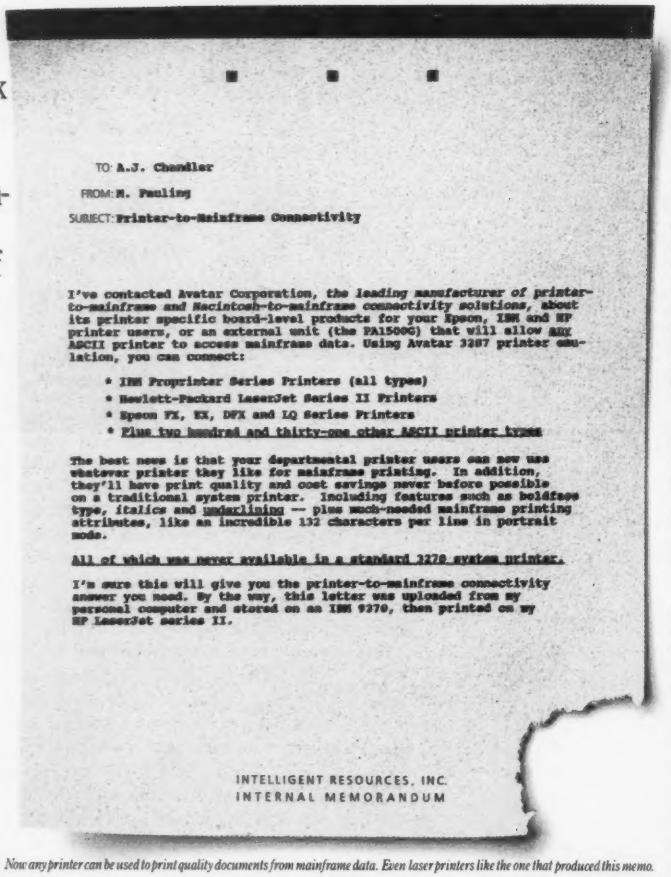
Once, the idea of getting printed mainframe information to look this good was just a little hard to swallow.

Understandable, considering the somewhat down-and-dirty nature of one of your average system printers.

A far cry, needless to say, from the advantages of ASCII printers. Whether it be the high quality, advanced capabilities and faster printing speeds of some. Or the significant cost savings of others.

Which is where Avatar's PA1500G, EP-Connect, PRO-Plus and Passport 3287 printer emulation products come in. Very simply, they make it possible for anyone in your organization who needs IBM mainframe information to get it quickly and easily using any ASCII printer. Everything from the IBM® Proprinters and the Epson series to the HP LaserJet II and everything in between.

They're easy to install, require very little training or MIS support and are fully compatible with IBM 3174, 3274 and 3276 control units.



TO: A.J. Chandler

FROM: M. Pauling

SUBJECT: Printer-to-Mainframe Connectivity

I've contacted Avatar Corporation, *the leading manufacturer of printer-to-mainframe and Macintosh-to-mainframe connectivity solutions*, about its printer specific board-level products for your Epson, IBM and HP printer users, or an external unit (the PA1500G) that will allow any ASCII printer to access mainframe data. Using Avatar 3287 printer emulation, you can connect:

- IBM Proprinter Series Printers (all types)
- Hewlett-Packard LaserJet Series II Printers
- Epson FX, EX, DFX and LQ Series Printers
- Plus two hundred and thirty-one other ASCII printer types

The best news is that your departmental printer users can now use whatever printer they like for mainframe printing. In addition, they'll have print quality and cost savings never before possible on a traditional system printer. Including features such as boldface type, *italics* and underlining -- plus much-needed mainframe printing attributes, like an incredible 132 characters per line in portrait mode.

All of which was never available in a standard 3270 system printer.

I'm sure this will give you the printer-to-mainframe connectivity answer you need. By the way, this letter was uploaded from my personal computer and stored on an IBM 9370, then printed on my HP LaserJet series II.

INTELLIGENT RESOURCES, INC.
INTERNAL MEMORANDUM

Now any printer can be used to print quality documents from mainframe data. Even laser printers like the one that produced this memo.

As you can imagine, the implications of all this are more than a little impressive. It means you can print mainframe data more cost efficiently than ever. It means you can print both local and mainframe applications on one printer.

But most of all, it means you can get more information into the hands of more people than you ever could before.

And because Avatar is the number one name in printer emulation technology, you can rely on getting the service, support and experience in IBM 3270 connectivity you expect.

For the name of your Avatar printer emulation distributor, call 1-800-289-2526, ext. 30. Or write Avatar Corporation, 65 South Street, Hopkinton, MA 01748.

We think you'll be impressed with what printer emulation can do for you. Once you get a taste of it.

Avatar

IBM is a registered trademark of International Business Machines Corporation. Avatar is a registered trademark of Avatar Corporation.

MICRO BITS

Michael Alexander

A tough haul, but worth it

I just spent the last couple of weeks slogging through *In the Age of the Smart Machine* by Shoshana Zuboff, an associate professor at the Harvard Business School.

The book was published several months ago, but it has taken me that long to find the energy to wade through its 450-plus pages. It's not the kind of book you would take to the beach on a sunny day to while away the hours — we're talking weighty, even tedious, stuff here. Nevertheless, if you can manage to get through this tome, you'll find that it carries a powerful message that virtually any manager with some responsibility for end-user computing must think about.

The book's message is that no matter what you have spent on information technology, you are probably not getting your money's worth. What's more, corporations cannot hope to completely leverage their investment in information technology without changing the corporation's culture.

What distinguishes information technology from earlier generations of machine technology

Continued on page 37

Price cuts no big deal

BY MICHAEL ALEXANDER
CW STAFF

Apple Computer, Inc.'s recent price cuts on some models of high-end Macintoshes may not be enough to prompt customers to rush out and buy the machines in the next quarter.

About the same time that Macworld Expo was wrapping up earlier this month, Apple announced that it had reduced prices on the Macintosh SE and Macintosh II and two models of the Macintosh IIX from 9% to 16% [CW, Jan. 23].

The price reductions coincided with the release of Apple's first-quarter earnings report two weeks ago, which revealed that profit margins slipped for the second consecutive quarter.

The culprit that caused Apple's gross margins to shrink slightly was the price hike it had announced in September, analysts said. While Apple's big customers did not entirely stop buying Macintoshes, they either scaled back their buying plans or bought machines in less rich configurations, they noted.

"The prices are still not as low as they were before the increase last September," said Rob Kinnin, microcomputer supervisor at Arthur Young in New York. "If they want to be competitive with MS-DOS machines, they are going to have to lower the price even more."

In a prepared statement, Apple said that its decision to cut prices was based on small decreases in the cost of some key components, including 1M-byte dynamic random-access memory chips and a shift in the last quarter in sales from more profitable high-end machines to less costly no-frills machines.

"Apple typically prices its machines according to what they feel they bring to the market in perceived value and on the cost of components," said John Wardley, senior analyst at International Data Corp.

Whether to buy Macintoshes instead of Microsoft Corp. MS-DOS machines is an issue that comes up a lot at Sea-Land Corp. in Elizabeth, N.J., said Jeff Kaplan, information center manager. Connectivity with mainframes and MS-DOS machines is one of the biggest concerns of large corporations, Kaplan said. While the Mac has made progress in this regard, it still has a way to go before it will compare favorably with an MS-DOS machine's capabilities, he said.

The Mac's pricing is not a factor, agreed Troy Williamson, a division manager at West Texas State Bank in Snyder, Texas: "I am still leery of buying Macintoshes because I am not convinced that the company has a strong enough commitment to real-world business issues."

The latest price cuts will also make room in the Mac product lineup for the new Mac SE/30, priced at between $4,369 and $6,569, which Apple officially introduced at Macworld Expo.

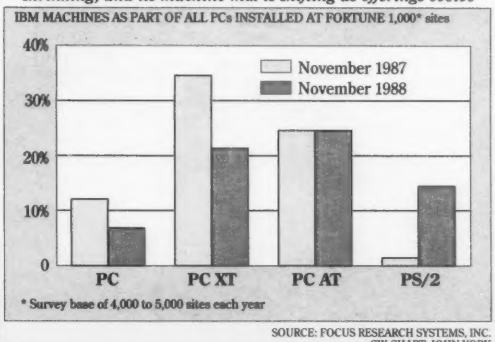
Inside

- Community college enrolls genetic tool. Page 35.
- Weyerhaeuser's Stephens talks user support. Page 35.
- Gupta Technologies gaining ground in the SQL war. Page 36.

Data View

IBM PC shuffle

Although IBM continues to carry most Fortune sites, its share is shrinking, and its machine mix is shifting as offerings evolve



SOURCE: FOCUS RESEARCH SYSTEMS, INC.
CW CHART: JOHN YORK

Macworld is showcase for third parties

BY JULIE PITTA
CW STAFF

SAN FRANCISCO — This year's Macworld Expo saw the ever-increasing popularity of Apple Computer, Inc.'s Macintosh II line among third-party developers.

However, industry watchers say the less expensive Macintosh SE line — particularly with the introduction of the Motorola, Inc. 68030-based Mac SE/30, priced at $4,369 for an entry-level configuration — will attract more interest among end users.

"As far as developers go, they are more interested in the modular Mac rather than the traditional Mac," said Bill Lempesis, a personal computer industry analyst at Dataquest, Inc., a San Jose, Calif.-based market research firm. "But customers tend to look at less expensive systems. We expect the Mac SE/30 to be a popular product for Apple."

Although Macworld, like other trade shows, is becoming less of a forum for debuts than in the past, a number of third parties did announce products.

Apple subsidiary Claris Corp.

Continued on page 37

If you answer Yes to two of these questions,

*A*re you developing mainframe COBOL, CICS or IMS applications?

*I*s your development environment sometimes counter-productive?

*W*ould you like to continue to program and test when the mainframe is down, slow, restricted or sixty miles away?

*W*ould you like to utilize the industry's best source code debugger to double your productivity?

*C*ould you develop CICS or IMS applications faster if you were free from the burden of TSO, poor response time and system crashes?

*D*o you want to develop and test massive programs and many megabyte data files on a PC without concern for the 640KB barrier?

*C*ould you use a compiler that handles OS/VS COBOL, VS COBOL II, ANSI'85 or ANSI'74 COBOL just by setting a switch?

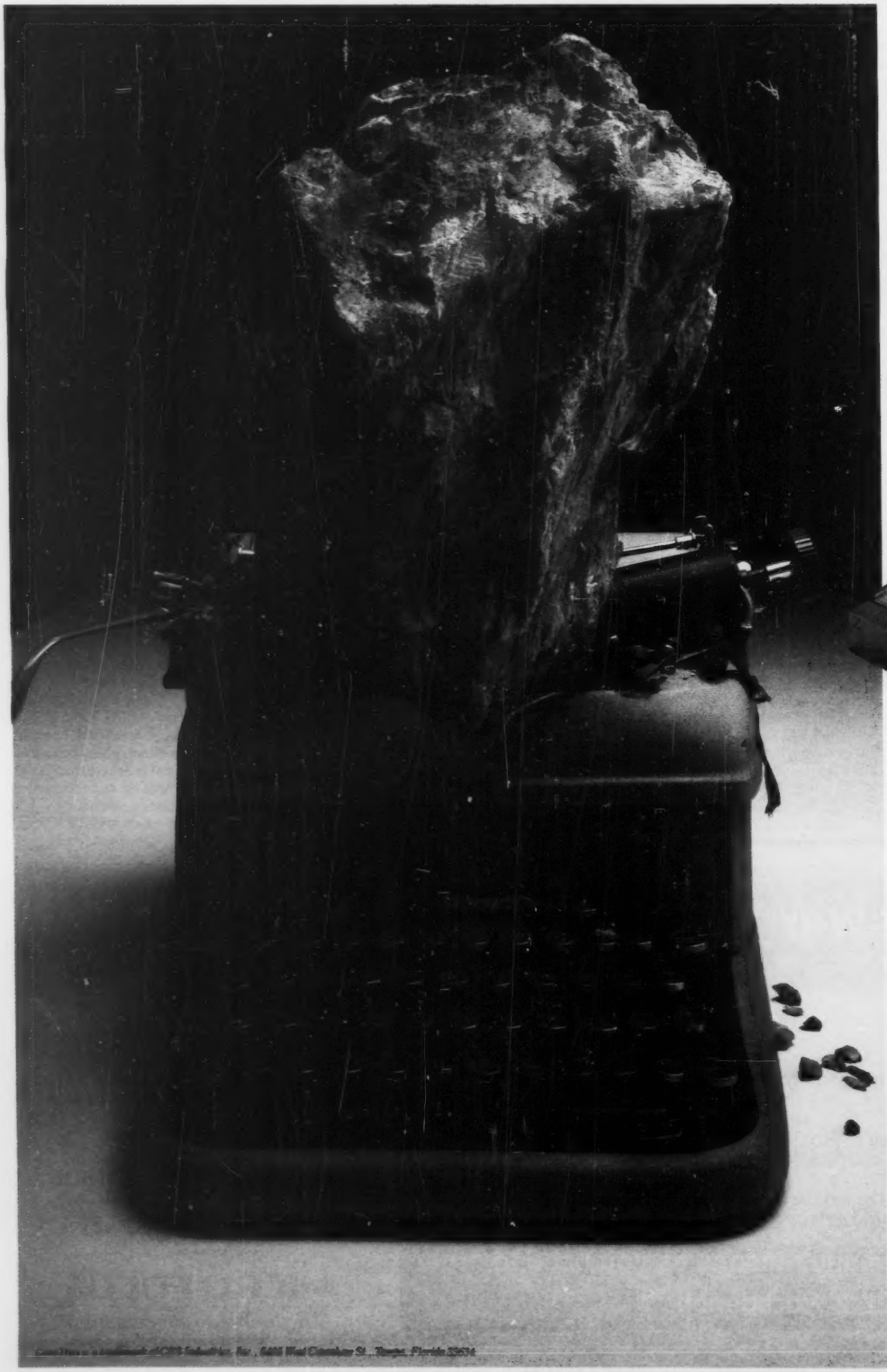
you have twice as many reasons as you need to order Micro Focus COBOL/2 Workbench.™

1-800-872-6265

MICRO FOCUS®

A Better Way of Programming™

Now imagine the same effect on your data system.



Submicron Contamination. It's impact on an EDP environment will bring things crashing down around you. I/O errors. Tape reclassification. Short circuits. And of course, head crashes.

Which is why we developed the CosaTron *ComputerPac.* Current mechanical ventilation systems were simply not designed for the filtration tolerances of your equipment. In fact, over 98% of damaging submicron particles are suspended in the air, driven by electrical space charge and too small to be captured in today's high efficiency air filters.

But this patented process works electronically to affect the polarity of these suspended contaminates, causing them to adhere to one another.

CosaTron ComputerPac is a self-contained, factory wired unit available in high profile (15") or low profile (10") models.

Once large enough, they're easily captured by CosaTron's filters. And by overcoming space charge they don't find their way into your sensitive equipment.

ComputerPac is not an ionizer. It produces no damaging ozone. No RFI. And *ComputerPac* is designed specifically for computer room down-flow AC application.

Because *ComputerPac* conditioned air controls contamination, your maintenance and cleaning costs are lowered, too. You'll want to know more. Call (813) 886-1717 for the name of the representative nearest you.

CosaTron *ComputerPac.* If you're working without it...you could just have rocks in your heads.

Leading Technology To Control Contamination

CosaTron®

A PRODUCT OF CRS INDUSTRIES INC.

SMALL TALK

Douglas Barney

Waving a carrot works

Going for the Green. If you want something done right, there are two choices: Do it yourself, or pay a lot of money. For the Lotus management team struggling to kick out 1-2-3 Release 3.0 by June, the answer is clearly to spend a lot of money.

Our sources tell us that $1 million is on the line. Heck — that's chicken feed compared with the $2 million bonus pool that Ashton-Tate offered its developers if they got Dbase IV out on time. But like a field goal kicker kicking in the wrong direction, Dbase IV missed its delivery date by a wide margin, and Ashton-Tate kept the $2 million.

While Lotus won't confirm the actual figure, it does admit that a bonus structure was put into place six months ago that applies across all product lines. Where some companies give out bonuses when a product ships, Lotus is a bit smarter. About half the money will be doled to developers if the product ships by June. The other half will come a few months later, if the product does not have any killer bugs that give the firm a black eye.

Despite the lure of cold, hard cash, the atmosphere within the Release 3.0 development group is like a slumber party without the fun. As President George Bush once said, "It is

Continued on page 37

WIS' Stephens directs PC traffic

ON SITE

Weyerhaeuser Information Systems (WIS) has the task of supporting the many branches of the giant wood products company in Tacoma, Wash. Most of the independent Weyerhaeuser companies have their own MIS groups, supported by WIS.

Elisabeth Stephens is manager of WIS' personal computing support group, including a Helpdesk line. Recently, Stephens spoke with Julie Pitta, *Computerworld's* West Coast correspondent.

What kind of equipment are you purchasing at Weyerhaeuser Information Systems?
We are a highly decentralized company. Every company within Weyerhaeuser works as though they're an independent company. The purchasing is not done through our group. We offer support. They use us as you would a contractor. Consequently, we work with a variety of vendors — Dell, Compaq, Tandy and Olivetti.

Is it difficult to provide support when users are purchasing such a wide variety of products?
It is, especially on the software side. We try to limit their choices. If users ask us, we will recommend certain kinds of products. But they don't have to ask us. There is no policy requiring our companies to purchase certain kinds of equipment.

Although we don't have any strict purchasing policies, people tend to stay in the mainstream because they want to be able to communicate with others in the company. Also, each individual department manager is responsible for their own bottom line, which motivates them to eliminate waste and extra cost.

On what basis do you make recommendations?
We test new equipment all the time — about three hardware platforms in any given month.

WIS' Stephens

We do 90 days of testing. We have about 50 different software packages on our recommendation list.

How was the Macintosh brought into Weyerhaeuser? Did your group recommend it?
Our users began bringing it in. Because we're decentralized, if our users bring a piece of equipment in, we have to learn to support it. In the beginning, it was difficult linking the Mac into the IBM world. But just because something's difficult doesn't mean it isn't the right thing to do. It's definitely the right tool in certain situations, especially for its graphics and desktop publishing. We've seen a tremendous growth in the use of the Mac.

The Macintosh II is being used by our technical center as a workstation for computer-aided design. The technical center is our research branch. I think the reason it's catching on is the ease of use. It's always been there, but people didn't recognize it. Until recently, the Mac hasn't been the best business tool.

What's your position on IBM's Personal System/2? Are you buying it?
We have a lot of clients that only buy IBM, so they're buying PS/2s. It's not a high figure, maybe about 10%. When it first came out, there were a lot of PS/2s that were DOA. With OS/2 and the Presentation Manager, it was definitely the direction IBM had to go. But it's not fully functional yet.

Genetic reproduction tool assists biology students

BY BONNIE MACKEIL
CW STAFF

If you were ever a student of biology, you may remember sitting in a classroom with a pot full of white and black beans trying to learn the Hardy-Weinberg law of gene equilibrium.

Today, biology students at Edmonds Community College in Lynnwood, Wash., have it easier. They are learning about genetic reproduction with the help of a software program called the Principles of Gene Equilibrium.

The program was developed by two professors at the college. Marc Reeder, an instructor in the computer information systems department, wrote the software in collaboration with Ken Marvel from the biology department, who provided the biological modeling.

The software, which was the college's first try at using computer-aided instruction, was designed to help students understand how changes in a gene pool result in evolution. The conventional method for studying the phenomenon required that students manually plot the incidence of dominant and recessive genes in generations of randomly selected bean pairs.

Mimic methodology
According to Reeder, the Principle of Gene Equilibrium program mimics the traditional bean methodology but is much more thorough and efficient. It allows students to trace a specific gene through more than 20 generations and study other forces affecting the population such as preferential mating, natural selection, mutation, immigration and attrition. Without the program, it would take an entire class period to get results on a much smaller population.

Although the program has been used successfully by first-year biology students at the college since 1983, a revised version is now being developed to take advantage of recent personal computer developments.

The original program ran on the IBM Personal Computer, PC XT and AT and compatibles. The later version will run on IBM Personal System/2s, allowing students to deal with larger population sizes. It will work with IBM's Color Graphics Adapter, Enhanced Graphics Adapter or Video Graphics Array boards for graphics display.

THE NEW #1 MICRO-MINI-MAINFRAME PROJECT MANAGEMENT SOLUTION.

Why did ARTEMIS,™ the best-selling mainframe project manager, link up with Time Line? Simple. To create a single #1 project management solution. For micros, minis, and mainframes.

As the #1 project manager on micros, Time Line adds a lot to the union. It's the best seller. It's also #1 with 48 of the Fortune 50. Plus, it has won the most awards of any project manager in history.* No wonder Time Line was voted #1 for corporate satisfaction in a recent survey in *PC Week*.

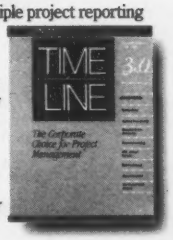
With ARTEMIS and Time Line, you can manage projects at different sites, then upload data into one master mainframe schedule. Multiple project reporting and tracking is easier. And a lot more accurate.

Software Digest Editor's Choice '86, '87 & '88

For connectivity, power, portability, and performance, you can't beat #1. Call now for a free Time Line demo disk (you may also qualify for our free corporate evaluation program). You'll see how the new #1 solution makes it easy to manage any size project, on any size machine . . . any way you want.

CALL FOR MORE INFO AND A FREE DEMO DISK: (800) 228-4122 Ext. 503CW

The #1 Project Manager



SYMANTEC™ Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014. 408/253-9600.

*Time Line is the #1 best-selling project manager (Survey of National Distributors). It also received InfoWorld, PC Magazine and Software Digest's highest 1988 ratings for project management programs. ARTEMIS is a trademark of Metier Management Systems, Ltd. Training and consulting services available, call 415/898-1919. © 1989 Symantec Corporation

Gupta Technologies' SQLbase gains third-party supporters

BY DOUGLAS BARNEY
CW STAFF

MENLO PARK, Calif. — Vendors engaged in the all-out war over SQL database engines have been fighting tooth and nail for the support of third parties. While SQL Server from Ashton-Tate Corp., Microsoft Corp. and Sybase, Inc. has rallied together the most supporters, SQL pioneer Gupta Technologies, Inc. is quickly gaining ground.

Gupta, which already has a joint development deal with Lotus Development Corp., said its SQLbase will be supported by a version of Advanced Revelation from Revelation Technologies, Inc. Advanced Revelation is generally used as a development tool for applications programmers.

Revelation is working on an interface that will work with a variety of SQL database engines, including Gupta's. The method, called bonding, should be ready for market this fall. Advanced Revelation reportedly supports ANSI-standard SQL and is being reworked for the IBM and Microsoft OS/2 operating system.

According to company officials, by working with Gupta's SQLbase, Advanced Revelation will also gain access to data residing in IBM's DB2, a popular mainframe database management system. Revelation also plans to work with SQL Server and IBM's OS/2 Extended Edition.

Gupta has pledges of support from Wordtech Systems, Inc., which markets an Ashton-Tate Dbase clone and a Dbase-compatible compiler, and Planet Software, a London-based firm that markets a program that allows users of Nantucket Corp.'s Clipper Dbase compiler to access the Gupta database.

Here's a portable computer that's a true IBM® PC compatible. With a removable, rechargeable battery pack built in, the Tandy 1400 LT is perfect for people on the go—like busy executives, sales personnel and journalists. Or you can use it like a desktop computer.

The Tandy 1400 LT features a high-resolution *backlit* liquid crystal display. The 80-character by 25-line resolution gives you the same quality of display as a full-sized monitor. And it's remarkably clear, thanks to the latest in "supertwist" LCD technology.

The 8088-equivalent microprocessor has a 7.16 MHz clock speed (vs. 4.77 MHz for other PC-compatible portables). Standard equipment includes two 720K 3½" built-in disk drives and 768K RAM—ample memory to run today's powerful MS-DOS based programs.

The Tandy 1400 LT also includes a parallel printer adapter, RGBI color monitor output, a real-time clock and an RS-232C serial interface. You even get MS-DOS 3.2 and GW-BASIC.

Come to your local Radio Shack and see the Tandy 1400 LT. (25-3500)

Send me a 1989 RSC-20 computer catalog.
Mail to: Radio Shack, Dept. 89-A-789
300 One Tandy Center, Fort Worth, TX 76102
Name _____
Company _____
Address _____
City _____ State _____
ZIP _____ Phone _____

Tandy Computers: Because there is no better value.™

MS-DOS/Reg. TM Microsoft Corp. IBM/Reg. TM IBM Corp.

Radio Shack
The Technology Store™
A DIVISION OF TANDY CORPORATION

Genifer code generator speeds task

BY KEVIN BURDEN
CW STAFF

Developing database applications is often time-consuming, but a code generator called Genifer from Bytel Corp. promises to speed the task for programmers.

Version 2.0 of Genifer is designed to enable programmers to create well-structured Ashton-Tate Corp. Dbase source code for database applications that have facilities for updating applications, relating multiple files and generating reports, menus and inquiry programs.

John Preston, an assistant professor at the College of Technology at Eastern Michigan University, uses Genifer to develop applications for clients of a business that he operates.

Preston began developing software for commercial energy audits. But the time savings and ease of use of Genifer has allowed him to build applications for a variety of other clients, he said. "I'm not in the software business, so if I had to write the code from scratch, I wouldn't be doing this," he explained.

The program allows end users to install an editor of their choice, so that the program code can be altered without the need to learn unfamiliar commands.

A real boost

Version 1.0, which supported only Dbase III, was introduced in January 1986. The generation process used skeleton files of partial basic codes to do common database functions. Version 2.0, which shipped in August, has Genifer Template Language at the heart of Genifer's applications development. Bytel offers templates to support major database dialects, including Nantucket Corp.'s Clipper, Wordtech Systems, Inc.'s DBXL, Wordtech's Quicksilver, Fox Software, Inc.'s Foxbase Plus and Dbase IV.

"I prefer the Quicksilver and Clipper dialects," said Homer Branch, a programmer analyst at Chevron Exploration Production Services Co., who has been using Genifer since its introduction. "I have a lot more control over what's done. With these dialects, I can add other high-level languages such as C and Pascal to get what Dbase doesn't offer, such as bit-level manipulations."

Genifer's report writer allows both screen and report programs to access up to nine database files and nine look-up files. The code is accessible, allowing a developer to add functions.

One user complained, however, that the report writer in Version 2.0 is overly ambitious. Once a report is specified, the programmer faces another input screen with an entire menu of text manipulation options, said Bill Ossler, project manager of end-user computing at GATX.

"It's not that the report writer falls short; I just feel they tried to do too many things for too many people instead of leaving it as a nice clean report," he explained. "I end up getting rid of most of the stuff because I'd never use it."

Genifer Version 2.0 retails for $395 and requires an IBM Personal Computer, PC XT, PC AT or Personal System/2.

Alexander

CONTINUED FROM PAGE 33

is that while it is used to automate a particular task, it also produces new information about that activity, Zuboff says.

"Infomating" is what she calls the unique capacity of taking objects and processes and translating them into data, making them more transparent.

Most companies are using information technology merely to make employees more productive or efficient — that's automating. But the payback will not come until information technology is used for strategic or competitive advantage — and that's infomating, Zuboff argues.

Making the most of infomating will require a change in the business structure, according to Zuboff. One reason for this requirement is that information technology makes it possible for everyone in the organization to know what is going on in the business. Thus, there is no longer any need to pass information up through the ranks to managers who make decisions and then back down to those who will implement them. Now, information should be exchanged between employees at whatever level it takes to get the job done. That means many decisions will be made at lower levels in the company, Zuboff notes.

Keep in mind that the employees who are at the lower levels of the organization are often those who are on the front line working with customers day-to-day. These are also the people who are among the first to know what it takes to keep customers coming back.

Pick up the book; it's a fascinating insight on how information technology will change the way we work in the 1990s. It will also give you some ideas about how to get more for your money.

Alexander is a *Computerworld* senior editor, microcomputing.

Macworld

CONTINUED FROM PAGE 33

introduced three Mac software packages. The latest version of Macwrite — Macwrite II — adds more than 50 features, Claris said.

Macwrite will be available in February at $249. Owners of Macwrite 5.0 can upgrade for a price of $65. Macdraw II, Release 1.1 is priced at $399 and is scheduled for release next month. Current Macdraw II users can upgrade for $30.

Claris also announced Claris CAD, a two-dimensional computer-aided design package. The package, like Macwrite II, runs on the Mac II, Mac SE and Mac Plus and is priced at $799. Macdraw II users can upgrade to Claris CAD for $399, the company said.

Acius, Inc. and Oracle Corp. said they have integrated their products, allowing Acius' Fourth Dimension for the Mac to act as a front end to Oracle's SQL-based database and networking software. Fourth Dimension SQL is scheduled for availability from Oracle in May at $199, which includes the interface to Fourth Dimension.

Hewlett-Packard Co. introduced an interface kit offering Mac compatibility for its Paintjet printer. It costs $125 and will be available next month.

Barney

CONTINUED FROM PAGE 35

tension city." Instead of facing Dan Rather's beading brow, Release 3.0 programmers are staring at Lotus Vice-President and disciplinarian Frank King, who vows to get the job done.

Like giggling children at an overnighter, Lotus programmers are at least being well-fed. Apparently, employees adept at cooking are making fabulous meals for the 30 hard-core coders that often work ferociously into the wee hours of the night. And the Lotus bug hunters can't leave for home until two bugs are found.

This inordinate pressure is creating some results. Although the Microsoft MS-DOS version is still a mite slow and big, what Lotus hopes will be a clean beta-test version should be out in a month. This will sit in users' hands for a few weeks before going back for final revisions. Nevertheless, we'll have to wait and see which bites first, Release 3.0 or mosquitoes.

Dbase IV directions. This'll be short and sweet. Dbase is all right for some, but for many people, it needs help, and that is exactly what Ashton-Tate claims it'll give it. Here's a quick list of the short-term goals. Ashton-Tate will improve its performance and fix its bugs. But first, it will ship out an OS/2 version, hopefully this month. Also, the firm has plans to integrate the easy-to-use Control Center interface with the hard-to-use IBM SQL data-access language.

OS/2 data. Seeing as OS/2 is shipping, Microsoft can again open its robes and show the world what it is up to. That is exactly what the firm will do at its Systems Software Seminar. Slated for discussion are the Intel 80386 version of OS/2 — actually expected late last year — and Microsoft's long-term plans to incorporate object-oriented features into the system. Hopefully, Microsoft's goals will be less foggy than the weather at its Seattle-area headquarters.

Barney is a *Computerworld* senior editor, microcomputing.

FROM THE CITY THAT GAVE US THE TALLEST BUILDING IN THE WORLD...

CHICAGO. Home to the Sears Tower. The most dominant presence on the city's skyline. And soon to be joined by another dominant presence:

COMDEX. The dominant, most widely recognized distribution event of the entire computer industry.

COMDEX/Spring '89. The premier gathering place for resellers, industry leaders, key suppliers and new-to-market companies. With a projected exhibitor base exceeding 1000, where significant business contacts and deals are made. And a much anticipated COMDEX Conference series where expert insights are revealed and new areas of opportunity and trends are identified.

COMDEX/Spring '89. An important forum for innovation and profit opportunity.

The first major marketing event of the new year. Carrying with it the record-breaking momentum of COMDEX/Fall '88. And the power and magnitude to push your sales to far greater heights.

COMDEX/Spring '89. For all the right reasons, plan to be there. For more information on exhibitors, conferences and registration, send in the coupon below.

I want a dominant position in the industry, too!

☐ Please send me complete attendee information.

☐ Please send me complete exhibitor information.

Name _____

Title _____

Company _____

Address _____

City _____

State _____ Zip _____

Telephone (_____) _____

CW130

Mail to: COMDEX/Spring '89, 300 First Avenue, Needham, MA 02194

Foreign Buyer Program

The More You Think About It, The More You Know You Have To Be There.

COMDEX/Spring '89

April 10–13, 1989 · McCormick Place, Chicago

⊠THE INTERFACE GROUP, Inc. ● ©1988 World's Leading Independent Producer of Conferences and Expositions

NEW AT MACWORLD EXPO

The following products were announced recently at Macworld Expo in San Francisco:

• **Micro Dynamics Ltd.** introduced its Apple Computer, Inc. Macintosh-based document-imaging system.

According to the company, the **Mars series** can archive virtually any type of electronic or hard-copy document, as well as any application or data file, onto high-capacity optical disks.

The product reportedly performs automatic Search and Retrieval functions based on any word or phrase, and typical transaction time is said to be less than five seconds.

The system can accommodate up to 100 users and is available in three basic versions with prices ranging from $45,000 to $1.2 million, depending on the number of users and configuration.

Micro Dynamics, Suite 802, 8555 Sixteenth St., Silver Spring, Md. 20910. 301-589-6300.

• **Macromind, Inc.** announced that its multimedia software application for the Macintosh is scheduled for delivery in March.

Formerly called Videoworks Professional, the package has been rechristened the **Macromind Director**. It contains tools for combining text, graphics, animation, audio and video and can be used to create desktop video productions as well as storyboarding, the vendor said. The product reportedly includes more than 100 new features, including color-palette control and automated animation, and is priced at $695.

Macromind, 1028 Wolfram, Chicago, Ill. 60657. 312-871-0987.

• **North Edge Software Corp.** introduced the upgraded version of its time and expense tracking and professional billing program, **Timeslips III.**

Version 1.1 reportedly allows the user to print bills in various fonts and rates, and details of client funds can now appear on bills, according to the company. The software is priced at $199.95 and operates on any Macintosh computer, beginning at the Macintosh Plus level. It requires 390K bytes of memory and a hard drive or two 800K-byte floppy drives.

North Edge, 239 Western Ave., Essex, Mass. 01929. 508-768-6100.

• A device management software tool for the Macintosh is now available from **Insight Development Corp.**

According to the company, **Macprint** is capable of driving Hewlett-Packard Co. Laserjet series printers and compatible devices from the Macintosh. The software is installed as a Chooser device using a supplied installer program and runs on the Macintosh Plus, Mac SE and Mac II.

Macprint costs $149.

Insight Development, Suite 140, 1024 Country Club Drive, Moraga, Calif. 94556. 415-376-9451.

• **General Parametrics Corp.** unveiled a desktop film recorder for use with its Videoshow electronic presentation systems for the Macintosh marketplace.

The **Photometric Slidemaker**, used in conjunction with Videoshow, is said to be capable of converting images produced on a desktop computer into 35mm slides at the user's desk.

Features include full-color on-line previewing and automatic text kerning and film-loading functions. The recorder costs $4,495.

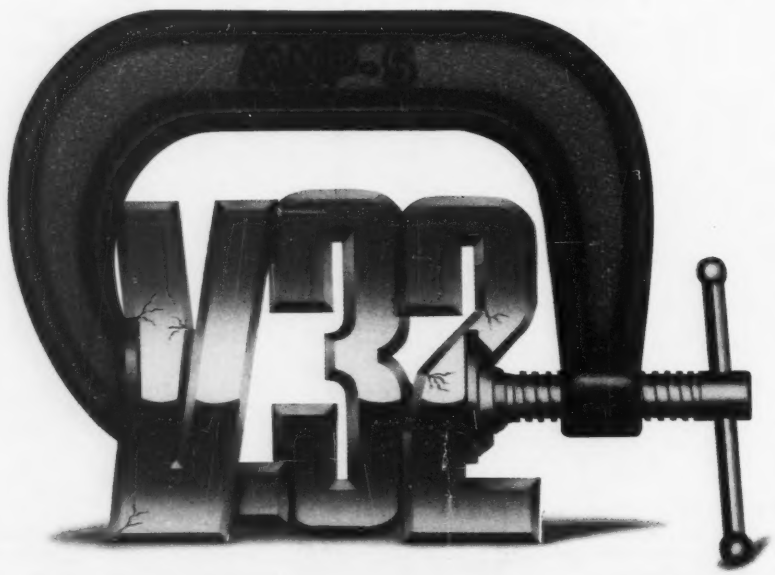
General Parametrics, 1250 Ninth St., Berkeley, Calif. 94710. 415-524-3950.

• **EMAC** unveiled two high-capacity storage products developed specifically for Macintosh II users working with large-scale graphics applications, large databases and computer-aided design and manufacturing environments.

The 5¼-in. half-height **150ID** reportedly provides 150M bytes of hard-disk storage capacity and does not require internal computer modifications. It is priced at $2,395.

The firm also introduced the **Impact Tape**, an external unit said to offer 155M bytes of backup-tape capacity. The product lists for $1,995.

EMAC, 48431 Milmont Drive, Fremont, Calif. 94538. 415-683-2222.



How UDS squeezes more out of the V.32 standard

Believe it! In the hands of UDS engineers, the V.32 standard means a lot more than 9600 bps, full-duplex.

Every UDS V.32 is fully compliant with the CCITT recommendation, but that's only the beginning. Model V.3225, the latest in the UDS V.32 family, offers *lots* of extra features.

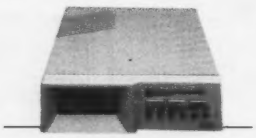
First of all, there's MNP level 5, the data compression/error control technique that increases data throughput by as much as a 2:1 ratio. In other words, a UDS V.3225 can give you full-duplex error-free communication at 19.2 kbps!

When your dedicated line goes down, V.3225 is the ideal dial back-up solution. It even checks the dead line periodically and switches back to it as soon as it's available.

Then there's V.22 *bis* operation; if your V.3225 receives a call at 2400 bps, it automatically drops to that speed, and full-duplex communication goes on.

Got a real data density problem? The card you get in your free-standing V.3225 can be plugged directly into the Universal Data Shelf," giving you as many as 16 channels in a standard 19- or 23-inch equipment rack.

To learn how the V.3225 can squeeze more from your datacomm system, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; FAX 205/830-5657.



V.3225
QUANTITY ONE PRICE:
$1145

Universal Data Systems
MOTOROLA INC.

Created by Daymon Hall, Inc., Winter Park, Florida

NEW PRODUCTS

Software applications packages

Buttonware, Inc. has announced a program offering file compatibility with Ashton-Tate Corp.'s Dbase III Plus software.

PC-File:DB will directly accept Dbase III Plus files and provides automatic record-locking functions and local-area network support, the vendor said.

PC-File:DB costs $89.95 and requires 416K bytes of available random-access memory and DOS 2.0 or higher.

Buttonware, P.O. Box 5786, Bellevue, Wash. 98006. 206-454-0479.

PC Publishing, Inc. has announced a product designed to enhance screen display and output for users of Lotus Development Corp.'s 1-2-3 spreadsheet.

Called **Impress**, the package reportedly provides several desktop publishing features, including eight different typefaces, eight levels of gray shadings and eight different colors. Users can also highlight important data with boxes, underlining, bolding or shading.

Impress costs $139.

PC Publishing, 1801 Avenue of the Stars, Los Angeles, Calif. 213-556-3630.

NETWORKING

DATA STREAM

Elisabeth Horwitt

Elite tact could win

I used to belong to a volunteer hot line organization. We had periodic reevaluation meetings for the purpose of regenerating our enthusiasm and clearing the air of old grievances. Unfortunately, too much time was wasted arguing picayune procedural points, and even when a spark was lit, it faded in a few months because the people involved had left the organization.

I was reminded of those happy gatherings at the recent meeting of the North American ISDN Users Forum, another organization that has commendable goals, spends too much time on procedural questions and suffers from volunteeritis — a largely unstable, spottily committed membership.

Let's start with the commendable goals. For years, users have complained that vendors have dominated the standards process without considering their needs. For years, vendors have said, "Fine, come to our meetings" — accurately predicting that the majority of businesses cannot afford to send their technically knowledgeable people to bimonthly meetings around the country.

The ISDN Users Forum offers users a chance to influence standards processes without making expensive commit-

Continued on page 42

Drivers fix Novell-IBM link

BY PATRICIA KEEFE
CW STAFF

Novell, Inc.'s resolution of compatibility problems with IBM's Token-Ring bridge software reportedly comes too late to save at least one major sale. But it should put to rest concerns at large Token-Ring sites about using a network application that talks to the Tokreui protocol from a Netware network.

A source close to Novell reported several months ago that Novell had lost at least one large account that was in the process of implementing a large network.

The account initially chose Novell but then switched to IBM when it realized that packets generated by Novell's Netware network operating system could not be transmitted over the IBM bridge. When questioned at the time, Novell would only say that it was aware of the problem and was working on it.

The problem reportedly stems from Netware's method of addressing packets and the fact that IBM uses a data link layer bridge vs. Novell's network layer bridge.

Two weeks ago, in an announcement at Macworld Expo, Novell said it had resolved this problem with the release of source-routing drivers said to enable IBM's Token-Ring Network Bridge to recognize and transfer Novell packets to servers or clients throughout the network. This also gives users an alternative choice of bridges when configuring the network, Novell said.

A joint effort

The drivers were jointly developed by Novell and Ungermann-Bass, Inc., a supplier of Token-Ring cards that also resells Netware and source routing bridges.

In a prepared statement, Richard King, general manager of the Netware Products Division, conceded that "Many of our large customers have indicated a desire to be able to access Netware file servers through IBM bridges from anywhere on their internetwork."

The issue has surfaced a couple of times for Chuck Saunders, a vice-president with The Riverbend Group in McLean, Va. But the network reseller was able to sidestep the problem by offering a way around the problem, which Saunders claimed is a better so-

Continued on page 40

Inside

- Industry looks for fiber optics from IBM. Page 40.
- Open Link gets a supporter. Page 40.
- Net products fly the Macworld Expo coop. Page 44.

Delta Air rehabs its backbone

BY JAMES DALY
CW STAFF

ATLANTA — The company that pioneered the idea of crop dusting in a small Georgia town 44 years ago is once again ready to do a little technological trailblazing.

When Delta Air Lines decided to overhaul the network that supports its data processing and reservation systems, it chose a technology that is like, and yet unlike, the traditional packet-switched network.

"We needed to greatly expand our network capacity," said Delta's Director of Communications Bob Woodyard. "We were looking for a whole bunch of im-

Continued on page 43

Data View

Users, implementors rate ISDN applications

A survey of 50 North American ISDN Users' Forum attendees

	Mean score*
Information sharing/Call management	8.89
PC-PC connect/Applications processing	8.14
Message desk	8.03
LAN bridging	7.95
Call manager	7.90
Desktop conferencing	7.88
Shared screen	7.73
Asynchronous networking/Information access	7.62
Modem pooling	7.55
Compressed video	6.36
Coaxial elimination	6.14
IBM 3270 emulation	5.09

* These and other applications rated on a scale of 0 (definitely will not try) to 10 (definitely will try)

SOURCE: NORTHERN TELECOM, INC.

ICA decries carriers' deregulation proposals

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — State regulators should respond to local carriers' proposals for deregulation with a big dose of skepticism, according to a white paper prepared by the International Communications Association (ICA).

The ICA, a league of 700 large telecommunications users, said the regulatory reforms being proposed by the telephone companies benefit the carriers far more than consumers and are based on only anecdotal evidence and speculative economic theories.

The white paper was released at a time when many state regulatory commissions and legislators are considering proposals to reduce regulatory oversight of network services that are allegedly open to competition. Deregulation proposals already have been adopted in states such as Nebraska, Idaho and Montana, ICA officials said.

Continued on page 42

ISDN users crave PC applications

BY ELISABETH HORWITT
CW STAFF

ST. LOUIS — A recently released survey of North American ISDN Users Forum members uncovered an unexpectedly strong demand for personal computer-related ISDN applications.

But respondents expressed reservations about the technology's comparatively low transmission rates and questioned whether it offers enough advantages over their present networks to justify its use for certain applications.

The survey, which was conducted by Northern Telecom, Inc. at last fall's ISDN Users Forum meeting here, asked attendees to rate various Integrated Services Digital Network (ISDN) applications that had just been demonstrated by the organization (see chart above).

The criteria

A rating of 10 indicated the strongest interest in seeing that application become commercially available; a rating of 0 indicated no interest. The 50 respondents to the survey were users and vendors that were either currently involved in ISDN or interested in becoming so.

Among the survey's findings were the following:

- Nine out of 10 of the top-rated applications had involved PCs in the demonstration, according to Northern Telecom spokesman Jay Brandstadter. The high ratings of applications such as information sharing and call management as well as message desk and desktop conferencing indicated a strong interest in "putting voice and data together on the PC, not just moving data between them," Brandstadter added.
- "Classic" ISDN applications such as modem pooling and coaxial cable elimination fared poorly. "People said, 'It looks good, but I need numbers' " on cost-justification, Brandstadter said.
- Low interest in IBM host access via ISDN reflected a low percentage of IBM users among respondents. This also lowered interest in coaxial cable elimination through ISDN.
- Among the most frequently cited reasons for low application ratings were the lack of security, lack of interoperability among different vendors' products and low transmission speeds, particularly for data-based applications such as LAN-to-LAN bridging and PC-to-PC connectivity.
- Several respondents questioned whether ISDN could provide significant benefits over their present non-ISDN system for applications such as modem pooling, message desk and PC-to-PC connectivity.
- Several respondents questioned whether they could cost-justify the more sophisticated applications such as desktop conferencing, shared screen and compressed video.

While respondents included 26 "implementors," including carriers, consultants and vendors, the study still reflected users' needs because "there were no statistically significant differences in application ratings" between the two groups, Northern Telecom said.

IBM stake in fiber firm sets industry rumbling

BY PATRICIA KEEFE
CW STAFF

CHATSWORTH, Calif. — The recent purchase by IBM of a 25% stake in PCO, Inc., an optoelectronics subsidiary of Corning Glass Works, has fired up industry expectations that IBM will deliver a series of products requiring fiber optics during the next two years.

PCO manufactures devices that allow high-volume data transmission on fiber-optic cable, and the purchase provides IBM with an external source of fiber-optics expertise.

IBM told analysts at a briefing more than a year ago to expect a 16M bit/sec. Token-Ring in 1988, which was delivered in December, and to look for an announcement regarding the 100M-bit Fiber Distributed Data Interface (FDDI) in 1989.

Not out front

"They'll probably announce FDDI in 1989, but I doubt they'll deliver it until 1990. They won't be first in this market," said Richard Villars, an analyst with International Data Corp., a market research firm located in Framingham, Mass.

IBM is also expected to announce "Summit," the code name for its next generation of mainframes that reportedly will require fiber channels, either late this year or early next year. "You need to have FDDI as an integrated part of your system," Villars said.

"IBM needs fiber in three places," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C. "Intraprocessor to connect to peripherals and replace the 3090; interprocessor, or channel-to-channel, from 600M bytes to 1.6G bytes; and networks."

The reason for waiting

The 16M-bit network is another reason IBM might drag its feet on FDDI, he said. "It's not really in their best interest to come out with FDDI that quick," Dzubeck said. IBM is also likely to wait until Advanced Micro Devices, Inc., a Sunnyvale, Calif.-based supplier of FDDI chips, is able to ship in volume; until a second chip source is available; and until the price of FDDI — an expensive undertaking — drops.

Yet another obstacle is the FDDI standard itself. A finalized draft was supposed to be ready in November; it has been delayed because of problems with the station management software segment of the standard.

Still, IBM clearly recognizes the future potential of fiber and has already begun to migrate to it, according to Villars.

The 8220 Optical Fiber Converter extender was announced in November for both the 4M and 16M bit/sec. Token-Ring. It will be available next month. Fiber as a media of choice for the 16M-bit should be announced sometime this year, Villars predicted.

BIT BLAST

Novell/Apple link gets support

The Systems Products Division of **Standard Microsystems Corp.** (SMC) said it will support the **Novell, Inc./Apple Computer, Inc.** Open Link Interface technology recently unveiled at Macworld Expo. SMC said it will write to the new standard by incorporating the Multiple Link Interface within its network adapter drivers, starting with its PC 500.

Sytek, Inc. has unveiled an OEM arrangement with **Sun Microsystems, Inc.** enabling it to resell the Sun-3 family of graphics workstations with Sytek's 9100 Network Management Center software.

Using **Timeplex, Inc.**'s Link/2 facilities management system, **Airline Telecommunications and Information Services** plans to expand what is called the world's largest specialized telecom network. The first phase includes installation of Link/2s in New York, London, Paris and Geneva. Another 20 nodes will be installed during the next 12 months.

Clarion Software Corp. and **Oracle Corp.** plan to jointly work on an interface for Clarion's Professional Developer software that reportedly will allow personal computer users to access data on Oracle's relational database management system directly, using a wide range of computers.

Westford, Mass.-based consulting company **TFS, Inc.** has acquired **Market Information Center, Inc.** The Marlboro, Mass.-based research company's Comm/Surv telecommunications research program will form the basis for future TFS services, according to the company.

Southwestern Bell Telephone and **Telenet Communications Corp.** have expanded their current packet-switching agreement to include Southwestern's largest metropolitan areas. The original agreement was limited to the eastern Oklahoma area.

Hughes Network Systems, Inc. has inked two pacts. It will provide the **Dow Jones Information Services Group** with an advanced packet-switching system slated to become operational in early 1989. Hughes will also provide a data, voice and video satellite communications network worth an estimated $7.4 million to the **Long Distance Telecommunications Administration of Taiwan.**

Separately, Hughes has signed a valued-added reseller agreement with **Nova-Net Communications, Inc.** to supply low-speed low-cost L-Band Satellite Terminals for remote site data collection.

Nova-Net is also working with **Teleport Denver, Inc.** to jointly install a very small-aperture terminal (VSAT) satellite hub facility at Teleport Denver. The company said the hub will be linked via fiber optics into Nova-Net's existing nationwide satellite network.

Videostar Connections, Inc. and **Cylix Communications Corp.** plan to jointly market VSAT video and data services. Cylix is a satellite network vendor; Videostar supplies equipment to television networks.

Proteon, Inc. has installed a network valued at about $1 million at the **Nissan Motor Co.** in Yokahama, Japan. The network links more than 20 buildings using the Pronet-80 fiber-optic backbone and Proteon's P4200 routers.

GE Information Services recently entered a five-year agreement with **GE Americom** that reportedly will make Americom's Ku-band satellite services available to GE Information Services users.

Ordernet Services has agreed to market **ASC Network Systems'** electronic data interchange (EDI) management software for IBM System/34 and 36 and Application System/400 computers, along with its own EDI translation software.

General Datacomm Industries, Inc. (GDC) has signed a contract with **Hitachi, Ltd.** in Japan to produce an Integrated Services Digital Network (ISDN) multiplexer in 1989. The two will jointly develop ISDN capability based on GDC's Megamux/Megaswitch line of multiplexers.

Shopping for CICS Information Retrieval Tools?

Try One-Stop Shopping.

Choose

ACCESS/1

- A Simple Query and Reporting Language for End Users
- Immediate On-Line Access to Information
- Produces Batch Reports
- Extracts and Downloads Data to PCs in One Easy Step
- Creates Output Files Using Selected Data from One or More Input Files
- Directly Accesses VSAM and SAM Files
- Optional Built-In Security

SONETICS CORPORATION

Call today for Free Query Evaluation Kit.
16375 Richmond Avenue • Suite 1583 • Houston, Texas 77042 • (713) 954-4444

Drivers

FROM PAGE 39

lution than Novell/UB drivers.

"You don't have to go over IBM's bridge," he said. Instead, users can bridge two Netware-based Token-Rings using Netware itself either by putting two cards in a server or into an external device. "You are bridging on the bus of the external or internal file server bridge, dividing the network up that way," Saunders explained.

"You generally want to be talking to a file server anyhow when you are working with Novell," he added, estimating that 99.9% of the network traffic communicates with the server.

This is typically what most people are using their local-area networks for today, agreed John Carosella, an analyst with Ernst & Whinney in McLean, Va. However, that is changing rapidly. More and more, users want to link LANs together or add host access capabilities to their network services.

Saunders suggested the new drivers are really targeted at IBM accounts that will not accept any noncompatible products. "The only situation where [Novell's drivers] would be better would be for workstation-to-workstation traffic," he said.

For example, a user on a LAN running IBM's 3270 Workstation Program while accessing an IBM 3174 is not processing Novell packets and is sending packets destined for a host, not another server, Carosella said.

One will do

Previously, in cases in which a network boasted both Novell-specific and IBM traffic, users might have required two bridges. Now, the drivers will allow a single bridge to support both Netware and IEEE 802.2 applications such as the Workstation program and Novell's Token-Ring Multi workstation software, Novell said. "Now you can just buy the bridge from IBM and the drivers from Novell. It's a simple fix," Carosella said.

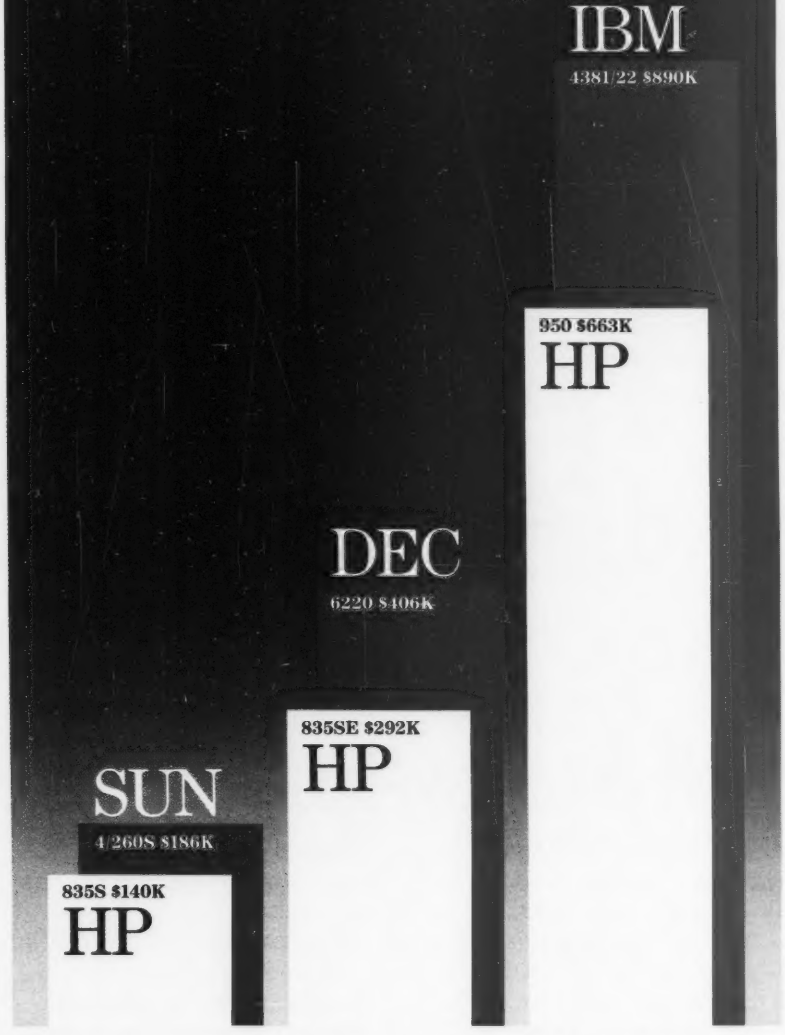
The source-routing issue is just a subset of a larger issue, said Lee Doyle, an analyst with International Data Corp., a market research firm based in Framingham, Mass. "One of the biggest problems today involves going through different gateways — they all have different Netbios implementations, lower layers, upper layers, etc.," he said.

"One of Novell's biggest weak points is stringing together remote Netware LANs," Doyle added. "They just don't have a good directory system or a good internetworking setup."

Saunders concurred. "I wouldn't argue with that. If you're speaking of remote bridging, [Novell's capability] leaves a lot to be desired," he said.

Conversely, Doyle said Banyan Systems, Inc., which makes Virtual Networking Software (Vines), stands out here, with its resource directory under Streettalk and "decent" internetworking protocols. The trade-off, he added, is that Vines is "clearly" not as fast a Novell in a standalone situation.

You wouldn't believe what computer systems cost these days.



If you thought Hewlett-Packard only made superior but expensive systems, maybe you should think again.

Just take a look at original purchase prices and support costs over five years. You'll see that HP computers can cost up to 28% less than comparable IBM, DEC and Sun systems.

Savings made possible thanks to HP's RISC-based Precision Architecture. And the reliability features we design into all our products to keep your service costs low and your systems uptime high.

With Precision Architecture, we've both simplified and speeded up the computer. We use fewer instructions, fewer parts. So you get more power in a smaller box for less money. You can even upgrade most systems just by exchanging a few boards.

And we build our computer systems around industry standards to give you true multi-vendor connectivity. Another considerable cost saving.

We also back them with the responsive support and service that has given HP the best overall record in Datapro surveys* over the past five years.

All of which gives Hewlett-Packard computers a significant edge over our competitors. Just as they can give your company the edge over yours.

For more hard facts about HP's approach to computing, call **1-800-752-0900, Ext. 282A.** The call is free. The savings could be substantial.

Note: The cost-of-ownership figures reflect the initial purchase price and 5-year hardware and software support costs for servers configured with operating systems, memory, mass storage and terminal connections. Prices as of October 1, 1988.

*Based on averaging six categories: Maintenance Effectiveness, Maintenance Responsiveness, Troubleshooting, Documentation, Education and Software Support.

HEWLETT PACKARD

© 1988 Hewlett-Packard Company IS02838

Horwitt

CONTINUED FROM PAGE 39

ments. Members of the Forum's ISDN Users Workshop come up with "applications" — functions or features they would like to see delivered through Integrated Services Digital Network. They submit these to the Implementors Workshop, a vendor body that is supposed to come up with a set of protocols for implementing those applications. They are supposed to use existing standards whenever possible. If there is no standard for a particular function, they pressure standards bodies to come up with one.

All this is laudable. The problem is that the Forum uses a pretty loose process for deciding on which applications to recommend. Any member of the Users Workshop can suggest an application. Any user who has attended two consecutive meetings can vote on whether a particular application is to be sent on to the Implementors Workshop. Forum membership carries no weighty membership fee or requirement for attending a certain percentage of meetings per year.

The advantage of this setup is that it encourages user companies to get involved in the ISDN development process, which in turn could accelerate demand for and availability of ISDN products. Even if a user attends only one Forum session per year, at least that company will have had some education in what ISDN is all about, according to Edward Hodgson, a Westinghouse communications manager and former chairman of the Users Workshop.

Yes, but the Forum is supposed to be more than just an ISDN consciousness-raising group for users. It also has the mandate of determining what ISDN functions the vendors will bring out first, and that means prioritizing the dozens of application suggestions that attendees have come up with so far. The Forum has just adopted a weighted voting system for prioritizing applications, but the prioritizing should begin before an application is proposed. Right now, an application can mean any number of things, including the following:

- Fundamental ISDN networking functions such as security and management interfaces between different types of equipment.
- Interfaces with computer and networking protocols such as Manufacturing Automation Protocol and Synchronous Data Link Control.
- More specialized functions such as LAN-to-LAN bridging and data conferencing.
- Even more specific functions tied to a given industry or job, such as sales information management.

The ISDN Users Forum needs to decide whether its mandate is to address all of the above ISDN areas or just some — and which areas first. Granted, its democratic method of selecting applications may produce some valuable ISDN products and boost user acceptance. No one seems to know exactly what will spark the ISDN market — perhaps a lot of practical, cost-cutting functions like cable elimination and modem pooling or exciting, esoteric applications like having a customer profile automatically appear on your screen when the customer calls.

That being the case, perhaps the Forum's haphazard method of collecting user priorities has some justification: Get enough individual dots together and you create a picture of the overall user population's wishes. But the ISDN Users Forum needs to be much more systematic if it wants to provide vendors with a more coordinated implementation strategy, ensuring that users get the basic ISDN features they need to start networking. Exciting applications aren't worth much if the basic systems support and reliability tools aren't there.

And a coordinated plan cannot be developed by a volatile group of volunteers. It needs a dedicated core of ISDN-literate users who are willing to attend regular meetings and ride herd on an application from the initial proposal all the way through vendor implementation. If that is elitism, make the most of it.

Horwitt is a *Computerworld* senior editor, networking.

ICA

CONTINUED FROM PAGE 39

Brian R. Moir, the ICA's counsel in Washington, D.C., said the white paper, which contains a set of regulatory guidelines to protect ratepayers, has been sent to all state commissions and key legislative committees.

The ICA said it rejects the view that deregulation must be accelerated. In essense, the ICA's message is that traditional regulatory policies, which recognize that local exchange carriers have monopoly control over the local network, have served the nation well. Reforms should be adopted only after careful review, it said.

State regulators should develop objective measures to determine whether a particular market is competitive and not rely on anecdotal evidence or assertions that competition is a theoretical possibility, the ICA said.

The telephone companies tend to treat uses of alternative technologies such as microwave, satellite and fiber optics as full-fledged competition. But the ICA argued that those technologies usually are used for niche applications and link up with the public network, so they are not likely to replace local exchange services.

Novell gateways undergo stress

At Novell, we think the true measure of reliability is real-life stress.

MIS managers tell us that real-life stress means gateways that support dozens of workstations. And that reliability is the single most important requirement. We listened. Then we set the same high product standards in connectivity that we have with NetWare®.

Optimal gateway reliability. A single NetWare SNA Gateway supports up to 97 workstations with reliable, simultaneous access to multiple IBM or compatible host sessions.

To prove just how reliable Novell gateways are, we have subjected them to the industry's most demanding high-capacity stress testing. And we're happy

©1989 Novell Inc., World Headquarters, 122 East 1700 South, Provo, Utah 84601 (801) 379-5900

Delta

CONTINUED FROM PAGE 39

provements: response time, increased reliability, more functionality."

Woodyard said he opted for packet switching to take advantage of its capability for adaptive routing and high-speed intermachine trunks. It was also less expensive than immediately installing a T1 network.

In 1987, Delta awarded the $25 million contract to rehabilitate its network to Alcatel N.V.'s Christian Rovsing Division. Christian Rovsing's communications processors allow the airline's hosts to provide the routing flexibility and bandwidth economies of packet switching without the need to translate host communications protocols to ANSI's X.25, according to Jeff Palmer, a spokesman for BBN Communications Corp. The Cambridge, Mass.-based packet-switch vendor purchased Christian Rovsing's product line in mid-1988.

Smooth connections

The communications processors directly packetize host transmission in the original host protocols — in Delta's case, either IBM Systems Network Architecture or Airline Link Control (ALC), Palmer said. "The object is to connect to host computers with minimal or no changes to the host software," he said.

As Delta's new vendor, BBN provided a new wrinkle for the airline's network.

> "MOST OF the people who've switched over don't even know they are on a different system. And that's just the way we wanted it."
>
> BOB WOODYARD
> DELTA AIR LINES

BBN's packet-switching system takes over some of the network-configuration and management tasks from the hosts. Ordinarily, much of the routing in a network is host-bound, but BBN allows direct routing between the terminal and the host without involving front-end processors.

The new data network, which is currently in the final year of a three-year development and implementation cycle, will handle all of Delta's domestic internal data communications as well as internal inventory, airport operations and flight operations data.

The network replaces a star-configured system composed of 9.6K bit/sec. dedicated lines running from four IBM 3090 mainframes at headquarters here to travel agencies and airport operations nationwide.

Under the network plan, lines will emanate like spokes on a wheel from the company's headquarters. The packet-switched backbone network will use 56K bit/sec. lines to attach 11 regional nodes across the country. Concentrators at each remote site will gather traffic from the 9.6K bit/sec. lines.

Three of the regional nodes are operational, and full implementation of all the sites is expected by the second quarter of this year.

The transmission of data back to the central site commences at the individual travel agencies, which are equipped with IBM Personal System/2 Model 30s as well as an IBM Personal Computer AT. The computers are hooked together via an IBM Token-Ring network that is linked into Delta's Datas II reservation system.

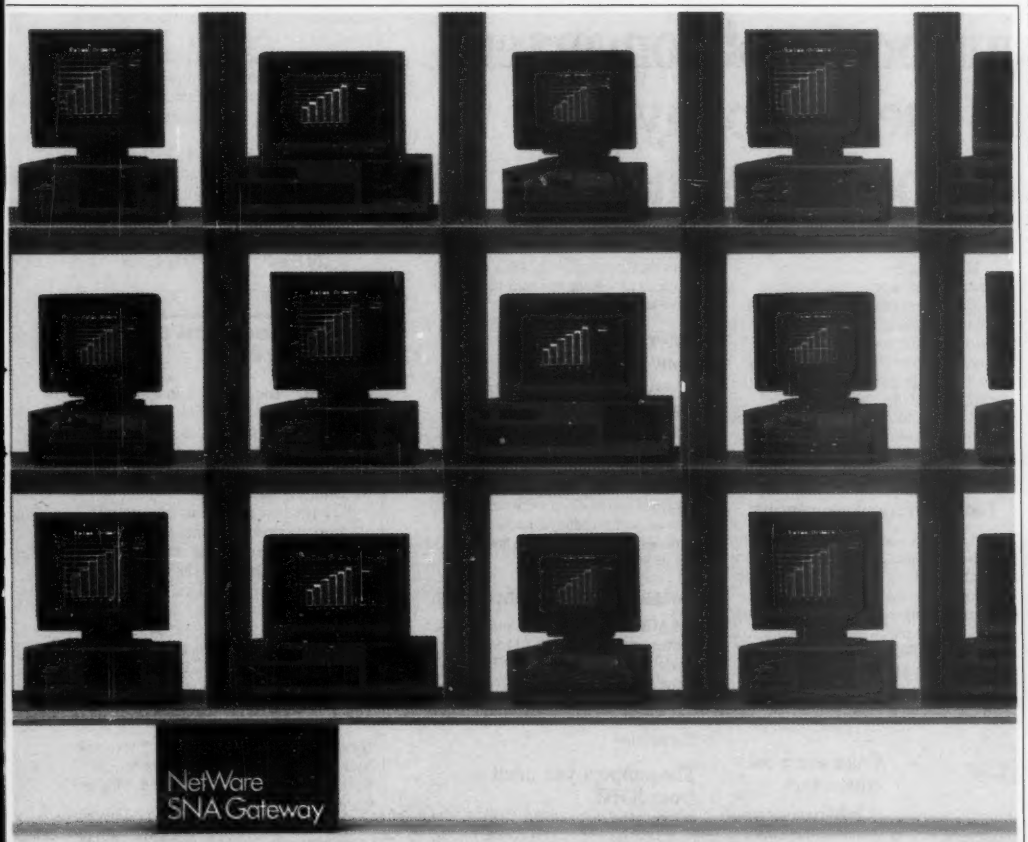
Their lines will feed into the regional nodes, which in turn plug into the central office. To speed transmission, regional lines run directly into the mainframe's channel rather than through an intermediate front-end processor, according to Woodyard.

Little traffic

While the system will begin at an easy pace of 1,000 transaction/sec., the setup has the capacity to handle up to 4,000 messages per second, Woodyard said.

While the current network is based on terrestrial lines, "we are testing satellite links in case of backup or land-line facilities failure," Woodyard said. The packet-switching system's adaptive routing feature will then kick in, and the system will route traffic in the most efficient manner, switching between the land lines and satellite links.

Except for the increased response time and reliability, "most of the people who've switched over don't even know they are on a different system," Woodyard said. "And that's just the way we wanted it."



testing so you won't have to.

to share the results with you. Just call 1-800-LANKIND and ask for our NetWare SNA Gateway Lab Report.

Ask for NetWare SNA Gateways. Make the reliable choice when it comes to LAN-to-mainframe connectivity. See your Gold Novell Authorized Reseller about NetWare SNA Gateways.

For your SNA Gateway Lab Report, or more information, call from your modem 1-800-444-4472 (8 bit, no parity, 1 stop bit) and enter NVSNA7.

NOVELL

For network solutions, you should be seeing red.

NEW! NEW! NEW!

ICF Catalog Support!

CMS/MVS Toolkit

Now access JES2 queues, ICF Catalogs and MVS DASD datasets, *directly from CMS.*

(312) 525-6400

ChicagoSoft

738 N. LaSalle St., Chicago, IL 60610

NEW! NEW! NEW!

NEW AT MACWORLD EXPO

The following products were announced recently at Macworld Expo in San Francisco:

• **Synoptics Communications, Inc.** and **Kinetics, Inc.** announced the integration of Synoptics' Lattisnet transceiver chip into Kinetics' recently introduced Etherport SE/30L network adapter.

This integration reportedly enables the SE/30L card to directly link Ethernet for the Apple Computer, Inc. Macintosh SE/30 to telephone wire using Synoptics' Lattisnet version of Ethernet. The combined product technology allows Ethernet to run on ordinary telephone wire at a rate of 10M bit/sec., according to the vendors' announcement. The Etherport SE/30L is priced at $795.

Synoptics, 501 E. Middlefield Road, Mountain View, Calif. 94043. 415-960-1100.

• **Avatar Corp.** introduced **Macmainframe SE/30**, a Macintosh-to-mainframe link said to support the Mac SE/30 computer and IBM 3270 networks.

The product is reported to be an internal card with software communications facilities that allow full IBM 3278/79 emulation and file transfer under IBM's CICS, TSO and CMS operating environments. Features include keyboard mapping, pull-down menus and copy-and-paste support.

Macmainframe SE/30 is scheduled for delivery in the spring and costs $995.

Avatar, 99 South St., Hopkinton, Mass. 01748. 508-435-6872.

• **Digital Communications Associates, Inc.** (DCA) said it will support the Macintosh SE/30 with a new version of its **Macirma** turnkey 3270 emulation package. Available later this year, the planned upgrade reportedly will allow the Mac SE/30 to appear as an IBM 3278 or 3279 terminal to an IBM host. It will include all the current Macirma features.

DCA, 1000 Alderman Drive, Alpharetta, Ga. 30201. 404-442-4000.

• **Jasmine Technologies, Inc.** unveiled a file server for Apple's Appletalk network said to emulate Apple's Appleshare server. **Directserve**, a dedicated server, allows Mac users to access the same files.

The cost per node in a system of 10 nodes is about $130; for 20 users, the cost is halved, the vendor said. It reportedly operates 20% to 40% faster than a Mac running as a file server and features compatibility with the Appletalk Filing Protocol.

Directserve costs $1,299 and is slated to ship in the spring.

Jasmine Technologies, 1740 Army St., San Francisco, Calif. 94125. 415-282-1111.

• **Simware, Inc.** released **Version 2.0** of its Macintosh-to-mainframe product, **Mac3270**. Designed to offer full-screen IBM host access and standardized file transfer independent of the 3270 emulation method, the latest version also provides error-free two-way Mac-to-mainframe file transfer capability across multiple communications paths, the vendor said. This includes support for dial-up, X.25, coaxial and IBM Systems Network Architecture.

Mac3270 2.0 costs $325 per single copy and is available for site licensing.

Simware, 20 Colonnade Road, Ottawa, Ont., Canada K2E 7M6. 613-727-1779.

Choose your protocol converter from the company that gives you more choices.

KMW Systems offers the most complete line of protocol converters available, designed with experience in data communications that no one else can claim. We invented our first protocol converter more than 11 years ago, and we've been helping companies make the right connections ever since.

KMW protocol converters allow local or remote connection of virtually any asynchronous device to any system using IBM protocols.

Batch protocol converters.

KMW batch protocol converters allow high-speed (up to 56 Kbps), high-volume batch processing without operator interaction. 3770, HASP, and 2780/3780 emulation allows connection to a variety of printers, plotters, minis, micros, and KMW graphic element processors. Features include auto sign-on, menu-driven setup, on-board diagnostics, and V.35 or RS-232 host interfaces.

Coax protocol converters.

Without any host modification, our one-port, receive-only unit provides 3287 emulation for connection to low-cost ASCII printers, plotters and other devices. And adding a KMW VP-10 graphics processor lets your mainframe drive raster output devices.

Interactive protocol converters.

3174/3274 SNA and 3271 BSC cluster controller emulation allows up to eight CRTs, computers, and printers remote access to your mainframe. For maximum productivity, printer pass-through allows you to send one set of data to your printer while you work on a different set of data on your terminal or micro. Other features include 25th status line, color, graphics support and APL.

Twinax protocol converters.

KMW also manufactures protocol converters for use with IBM System 34/36/38 computers. KMW's Twinax converter lets you make the most of your System/3X, by allowing communication with ASCII printers, CRTs, PCs, and Macintoshes.

The support you need — from KMW.

You can count on KMW to provide the protocol converter you need — and to back it up with excellent service. We also offer a technical support hotline for immediate answers to your questions.

Make the right connections — with KMW protocol converters, graphics processors, and channel interfaces. KMW has sales representatives across the nation, as well as in London. Call **(800) 531-5167** for the sales office nearest you.

KMW SYSTEMS CORPORATION

(800) 531-5167
In Texas, (512) 338-3000

IBM is a registered trademark of International Business Machines, Inc. • Macintosh is a trademark of Apple Computer, Inc.
©1988 KMW Systems Corporation

NEW PRODUCTS

Local-area networking hardware

Interlan, Inc. has announced the **NI5210-STP** data-link controller, which allows IBM Personal Computers, PC XTs and ATs or compatibles to use any shielded twisted-pair wiring scheme, the company said.

The product reportedly converts PCs in a work group to Ethernet file servers or workstations capable of operating at a 10M bit/sec. data rate. The network connection is accomplished via a 9-pin connector.

The controller is priced at $495.

Interlan, 155 Swanson Road, Boxboro, Mass. 01719. 508-263-9929.

Network management

Dayna Communications, Inc. will launch **Daynanet**, a server-based network operating system bundled with an interface card.

Network features reportedly include support for up to 100 users; an Apple Computer, Inc. Appleshare-like interface; a range of administration, security and print services; support for Novell, Inc.'s Message Handling Service and IBM's Network Control Program on IPX protocols, as well as many other Advanced Netware capabilities; support for Apple's Appletalk Filing Protocol and Printer Access Protocol; and the ability to upgrade to Novell's full Advanced Netware or SFT Netware.

The product does not support IBM's Netbios.

Dayna bundles its Daynatalk PC Card as the interface card. The server supports up to four cards or four separate networks.

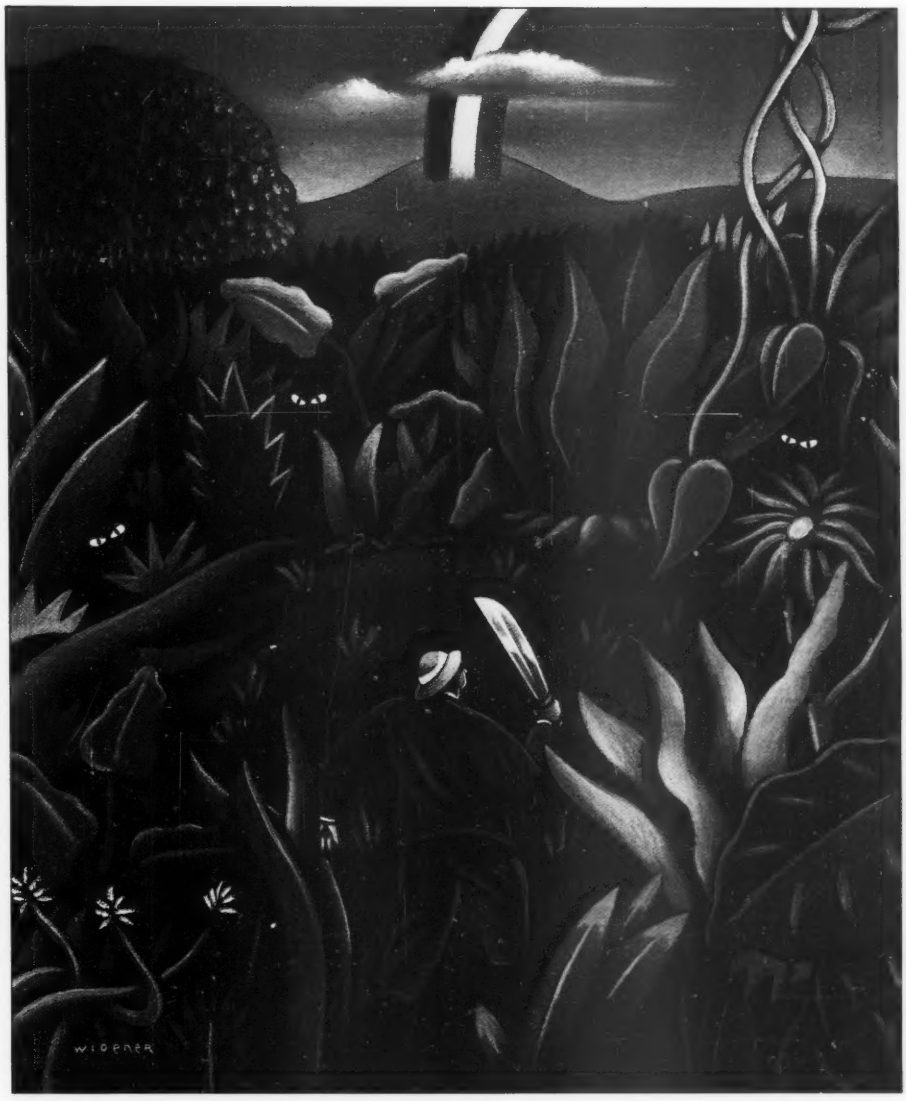
Available at the end of the first quarter, Daynanet software costs $1,249 per server for Localtalk or $1,749 for Localtalk and Ethernet.

Dayna, 5th floor, 50 S. Main St., Salt Lake City, Utah 84144. 801-531-0600.

SPECIAL REPORT

COMMUNICATIONS INNOVATORS

Network pioneers blaze trails to a competitive edge



- **Four roads to DEC-IBM integration**
- **How to slash costs with ISDN, CIM, LANs**
- **Balancing network access and security**

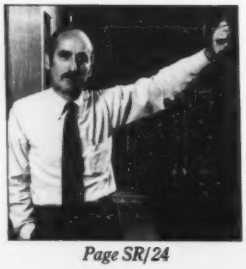
INSIDE

Page SR/8

Page SR/14

Page SR/15

Page SR/22



Page SR/24

SR/4 **What does it take** to be a network pioneer? Only the willingness to take untrodden paths to achieve the security, reliability, reduced costs or productivity gains your company needs. Why take the risk? Because the pioneer's way often leads to more complete solutions, happier users and greater paybacks than those found on the tried-and-true course. *By Elisabeth Horwitt*

SR/5 **Westinghouse Corp.**
By Arielle Emmett
Rather than wait for a true multivendor network management standard to arrive, managers went ahead and rolled their own artificial intelligence-based system.

SR/6 **Citytrust Bancorp, Inc.**
By Ricardo Dobson
Customer data was available, but end users balked at using complex commands to find it. Now, a PC-based system guides them through the mainframe maze.

SR/8 **Carnegie-Mellon University**
By Arielle Emmett
A hodgepodge of network and desktop products isolated university users groups until IS brought everyone together with common communications software.

SR/10 **U.S. Navy**
By Jim Leeke
Wanted: One reliable, expandable, survivable network to replace the spaghetti-like communications systems on board the Navy's ships.

SR/12 **Levi Strauss & Co.**
By Barbara Sehr
Electronic data interchange promised to speed up order processing for the clothing maker; but first, IS had to get retailers to use the link.

SR/14 **Skidmore, Owings & Merrill**
By Jean S. Bozman
A "virtual mainframe" of networked IBM RTs lets architectural designers collaborate and managers control costs by rearranging the configurations.

SR/15 **Fidelity Investments**
By Alan Radding
If the firm doubted it needed an alternative to Ma Bell's local connections, the Illinois switching station fire in May convinced it of the need for a bypass network.

SR/18 **The city of Alexandria, Va.**
By Thomas Nolle
Using the mainframe as PC communications coordinator was hurting response time. The answer: The local Bell operating company's central office-based LAN.

SR/19 **M. W. Kellogg Co.**
By Ira Dember
Can anybody here support these LANs? Kellogg managers rallied to the task with answers that include a customizable operating system interface.

SR/20 **Pacific Gas & Electric Co.**
By Clare P. Fleig
The utility wanted to make networks easy to use but also safe from tampering. Multiple-level passwords and dial-back capability help maintain security.

SR/22 **The city of New York**
By Robert Moran
Citynet will link 12 municipal data centers, eliminating overlapping networks and boosting reliability. It's also expected to save $1.5 million a month.

SR/24 **Tenneco, Inc.**
By Thomas Nolle
A pioneering implementation of ISDN has yielded lower connection costs, increased flexibility and upped the potential for more creative applications.

SR/28 **Weyerhaeuser Co.**
By Bruce Richardson
It was 20 years ago that the New Bern, N.C., pulp plant became state of the art. Time for another update with plantwide CIM this round.

SR/30 **G. D. Searle & Co.**
By John Kador
How do you pacify DEC and IBM users who find themselves working with the other brand? Gateway and file transfer products come to the rescue.

SR/32 **Bechtel Group, Inc.**
By Phillip J. Gill
When nuclear power construction dried up, the builders turned to a multitude of smaller projects. Satellites help them set up connections anywhere, quickly.

Edited by Elisabeth Horwitt and David Ludlum

Cover art by Terry Widener

HOW MANY CHECKS WILL IT TAKE TO NETWORK YOUR ENTIRE COMPANY?

AS MANY CHECKS

MAINFRAMES

Amdahl
- ☐ 5880
  - ☐ Model 180E
  - ☐ Model 190
  - ☐ Model 190E
  - ☐ Model 295*
  - ☐ Model 200E
  - ☐ Model 300
  - ☐ Model 300E
  - ☐ Model 390E
  - ☐ Model 400E
  - ☐ Model 600E
- ☐ 5990
  - ☐ Model 700
  - ☐ Model 1400

Control Data
- ☐ Cyber 900 Family
  - ☐ Cyber 930
  - ☐ Cyber 960
  - ☐ Cyber 990

Cray
- ☐ Cray Supercomputers
  - ☐ Cray-2
  - ☐ Cray X-MP
  - ☐ Cray Y-MP

Hitachi
- ☐ L Series
  - ☐ L 450
  - ☐ L 470
- ☐ M Series
  - ☐ M 220
  - ☐ M 240
  - ☐ M 630
  - ☐ M 640
  - ☐ M 660
  - ☐ M 680

Honeywell Bull
- ☐ DPS 7000 Series
  - ☐ 7000/10
  - ☐ 7000/20
- ☐ 7000/30
- ☐ 7000/40
- ☐ 7000/50
- ☐ 7000/72
- ☐ 7000/82
- ☐ 7000/92
- ☐ DPS 8
  - ☐ 52
  - ☐ 62
  - ☐ 70
- ☐ DPS 8000 Series
  - ☐ 8000/41
  - ☐ 8000/81
  - ☐ 8000/82
  - ☐ 8000/83
  - ☐ 8000/84
- ☐ DPS 88 Series
  - ☐ 41
  - ☐ 42
  - ☐ 81
  - ☐ 82
  - ☐ 861
  - ☐ 862
  - ☐ 891
  - ☐ 892
- ☐ DPS 90 Series
  - ☐ 91
  - ☐ 92
  - ☐ 93
  - ☐ 94

IBM
- ☐ 370 Family
- ☐ 308X Family
- ☐ 3090 Family
  - ☐ 3090 Model 120E
  - ☐ 3090 Model 150E
  - ☐ 3090 Model 180E
  - ☐ 3090 Model 200E
  - ☐ 3090 Model 390E
  - ☐ 3090 Model 400E
  - ☐ 3090 Model 600E
- ☐ 4381 Family
  - ☐ 4381 Model Group 11
  - ☐ 4381 Model Group 12
  - ☐ 4381 Model Group 13
  - ☐ 4381 Model Group 14
  - ☐ 4381 Model Group 21
  - ☐ 4381 Model Group 22
  - ☐ 4381 Model Group 23
  - ☐ 4381 Model Group 24
- ☐ 5360 System Unit
- ☐ 5362 System Unit
- ☐ 5363 System Unit
- ☐ 9370 Family
  - ☐ 9373 Model 20
  - ☐ 9375 Model 40
  - ☐ 9375 Model 60
  - ☐ 9375 Model 90

NAS
- ☐ NAS AS/VL Series
  - ☐ AS/VL 40
  - ☐ AS/VL 50
  - ☐ AS/VL 60
  - ☐ AS/VL 80
- ☐ NAS AS/XL Series
  - ☐ AS/XL 50
  - ☐ AS/XL 60
  - ☐ AS/XL 70
  - ☐ AS/XL 80
  - ☐ AS/XL 90
  - ☐ AS/XL 100

NCR
- ☐ NCR I Series
  - ☐ I-9400
  - ☐ I-9500
- ☐ NCR V Series
  - ☐ V-8600 Series
  - ☐ V-8800 Series
- ☐ NCR System 10000 Family
  - ☐ Model 35
  - ☐ Model 55
  - ☐ Model 65
- ☐ Model 75
- ☐ NCR 9800 Series
  - ☐ 9811
  - ☐ 9821
  - ☐ 9822
  - ☐ 9832
  - ☐ 9842
  - ☐ 9844
  - ☐ 9863

Nixdorf
- ☐ 8880

Siemens
- ☐ 7000

Tandem
- ☐ VLX

Unisys

Sperry
- ☐ 1100 Family
  - ☐ 1100/91
  - ☐ 1100/92
  - ☐ 1100/93
  - ☐ 1100/94
  - ☐ 1100/71
  - ☐ 1100/72
  - ☐ 1100/73
  - ☐ 1100/74
- ☐ 2200 Family
  - ☐ 2200/201
  - ☐ 2200/202
  - ☐ 2200/203
  - ☐ 2200/204
  - ☐ 2200/401
  - ☐ 2200/402
  - ☐ 2200/403
  - ☐ 2200/404

Burroughs
- ☐ A Series
  - ☐ A1
  - ☐ A2
  - ☐ A3
  - ☐ A4

PERSONAL COMPUTERS, WORKSTATIONS & TERMINALS

3Com
- ☐ 3Station

ACER
- ☐ ACER 710
- ☐ ACER 900
- ☐ ACER 900/12
- ☐ ACER 910
- ☐ ACER 1020
- ☐ ACER 1100

Alcabel
- ☐ XTRA Pro. Series 300 Workstation
- ☐ XTRA Pro. Series 400 Workstation
- ☐ XTRA Pro. Series 700 Workstation

Altos
- ☐ 3068
- ☐ 686
- ☐ 886
- ☐ 1086
- ☐ 2086
- ☐ Series 1000
- ☐ Series 2000
- ☐ Series 500

AMDEK
- ☐ System/88
- ☐ System/286
- ☐ System/286A
- ☐ System/386
- ☐ System/386E

Amstrad
- ☐ PPC 512
- ☐ PPC 640
- ☐ PC 1512
- ☐ PC 1640

Apollo
- ☐ DN 10000 Series
- ☐ DN 300 Series
  - ☐ DN 300
  - ☐ DN 320
  - ☐ DN 330
- ☐ DN 3000 Series
  - ☐ DN 3000
  - ☐ DN 3010
  - ☐ DN 3050
- ☐ DN 400 Series
  - ☐ DN 400
  - ☐ DN 420
  - ☐ DN 460
- ☐ DN 4000 Series
- ☐ DN 5XX Series
  - ☐ DN 550
  - ☐ DN 560
  - ☐ DN 570
  - ☐ DN 570 Turbo
  - ☐ DN 580
  - ☐ DN 580 Turbo
  - ☐ DN 590
  - ☐ DN 590 Turbo
- ☐ DN 600 Series
  - ☐ DN 600
  - ☐ DN 660
- ☐ DSP-80
- ☐ DSP-90

Apple
- ☐ Macintosh 512
- ☐ Macintosh 512K E
- ☐ Macintosh Plus
- ☐ Macintosh SE
- ☐ Macintosh II

AST
- ☐ Premium/286
- ☐ Premium/386
- ☐ Premium Workstation
  - ☐ Model 200
  - ☐ Model 203
  - ☐ Model 205
  - ☐ Model 243

AT&T
- ☐ 6286 WGS
- ☐ 6300 WGS
- ☐ 6300 + WGS
- ☐ 6312 WGS
- ☐ 6386 WGS
- ☐ 6386E WGS

Businessland
- ☐ Wyse 386
- ☐ Wyse 286

Canon
- ☐ A-200SX
- ☐ A-200SX II
- ☐ A-200 III

Compaq
- ☐ Deskpro 286
- ☐ Deskpro 386
- ☐ Deskpro 386/20
- ☐ Deskpro 386/25
- ☐ VT-300 Series
- ☐ VT-200 Series
- ☐ VT-100 Series
- ☐ Model 1253
- ☐ Model 1263
- ☐ GRiDCase DXP
- ☐ Model 1255
- ☐ Model 1265
- ☐ GRiDLite
- ☐ GRiDLite Plus
- ☐ GRiDCase 1520

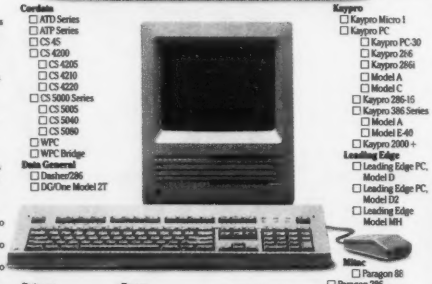
- ☐ Deskpro Model 2
- ☐ Plus
- ☐ Portable 386
- ☐ Portable II
  - ☐ Model 2
  - ☐ Model 4
- ☐ Portable III
  - ☐ Model 20
  - ☐ Model 40

Counterpoint
- ☐ BC88
- ☐ BC286

Counterrevolution
- ☐ 30M
- ☐ 32
- ☐ 33
- ☐ 34

Cordata
- ☐ ATD Series
- ☐ ATP Series
- ☐ CS-45
- ☐ CS-4200
  - ☐ CS-4205
  - ☐ CS-4210
  - ☐ CS-4220
- ☐ CS 5000 Series
  - ☐ CS 5005
  - ☐ CS 5040
  - ☐ CS 5080
- ☐ WPC
- ☐ WPC Bridge

Data General
- ☐ Dasher/286
- ☐ DG/One Model 2T



Datavue
- ☐ DV 2502
- ☐ DV 2503
- ☐ DV 2504
- ☐ DV 2300 Series
  - ☐ DV 25-2302FL
  - ☐ DV 25-2303FL
  - ☐ DV 25-2304FL
- ☐ DV 2400 Series
  - ☐ DV 25-2402
  - ☐ DV 25-2403
  - ☐ DV 25-2404
- ☐ Snap I + I
  - ☐ Model 01
  - ☐ Model 01EL
  - ☐ Model 01GL
- ☐ Spark
  - ☐ Model 3841
  - ☐ Model 3842
  - ☐ Model 6401
  - ☐ Model 6402

Dell
- ☐ PC's Limited Turbo
- ☐ Dell System 200
- ☐ Dell System 220
- ☐ Dell System 310

Digital Equipment Corp.
- ☐ VAXmate
- ☐ PC500

Epson
- ☐ Equity I +
- ☐ Equity II +
- ☐ Equity I7
- ☐ Equity III +

Ericsson
See Nokia Data

Esprit
- ☐ Esprit I
- ☐ Esprit II
- ☐ Esprit III
- ☐ Esprit 6800 Series
- ☐ Esprit Opus 3ml

Everex
- ☐ Step 80286
  - ☐ 286/12
  - ☐ 286/16
- ☐ Step 80386
  - ☐ 386/16
  - ☐ 386/20

Franklin
- ☐ PC-4000
- ☐ PC-8000

Grid
- ☐ GRiDCase 2,3
  - ☐ Model 1250
  - ☐ Model 1252
  - ☐ Model 1260
- ☐ GRiDCase Plus 2,3
- ☐ GRiDCase 1530

Hewlett-Packard
- ☐ HP 250X
- ☐ HP Vectra
  - ☐ Model 25
  - ☐ Model 45
  - ☐ Model 50
  - ☐ Model 60
- ☐ HP Portable Plus
  - ☐ Model 4S71IF
  - ☐ Model 4S71IE
- ☐ HP Portable Vectra CS
  - ☐ Vectra CS
  - ☐ Vectra CS Model 20
- ☐ HP Vectra CS PC
  - ☐ Model 10
  - ☐ Model 11
  - ☐ Model 12
  - ☐ Model 20
- ☐ HP Vectra ES PC
  - ☐ Model 10
  - ☐ Model 20
  - ☐ Model 21
  - ☐ Model 22
- ☐ HP Vectra ES/12 PC
  - ☐ Model 10
  - ☐ Model 20
  - ☐ Model 40
- ☐ HP Vectra RS/16 PC
- ☐ HP Vectra RS/20 PC
  - ☐ Model 40
  - ☐ Model 100
  - ☐ Model 150
  - ☐ Model 300

Honeywell Bull
- ☐ PC AP-X Series
- ☐ PC XP Series
- ☐ PC SP Series

Hyundai
- ☐ Super-16T
- ☐ Super-286
- ☐ Super-286C

IBM
- ☐ PC Convertible
- ☐ PC XT
- ☐ PC AT
- ☐ PC
- ☐ PC XT 286
- ☐ PS/2 Model 25
- ☐ PS/2 Model 30
- ☐ PS/2 Model 50
- ☐ PS/2 Model 60
- ☐ PS/2 Model 70
- ☐ PS/2 Model 80
- ☐ 3151 ASCII Display Station
- ☐ 3161 ASCII Display Station
- ☐ 3162 ASCII Display Station
- ☐ 3163 ASCII Display Station
- ☐ 3164 ASCII Display Station

Intergraph
- ☐ InterPro
- ☐ InterAct
- ☐ InterView

Kaypro
- ☐ Kaypro Micro 1
- ☐ Kaypro PC
  - ☐ Kaypro PC-30
  - ☐ Kaypro 286
  - ☐ Kaypro 286i
  - ☐ Model A
  - ☐ Model C
- ☐ Kaypro 286-IS
- ☐ Kaypro 386 Series
  - ☐ Model A
  - ☐ Model E-40
- ☐ Kaypro 2000 +

Leading Edge
- ☐ Leading Edge PC, Model D
- ☐ Leading Edge PC, Model D2
- ☐ Leading Edge Model MH

Mitac
- ☐ Paragon 88
- ☐ Paragon 286
- ☐ Paragon 286S
- ☐ Paragon 286V
- ☐ Paragon 286VE
- ☐ Paragon 386
- ☐ Paragon 386E

Mitsubishi
- ☐ MP 286 Series
  - ☐ Model 310
  - ☐ Model 320
  - ☐ Model 340
- ☐ MP 386

NCR
- ☐ PC6
- ☐ PC710
- ☐ PC810
- ☐ PC916
- ☐ 3390
- ☐ 3392

NEC
- ☐ PowerMate 1
  - ☐ H200-1B
  - ☐ H201-1B
  - ☐ H202-1B
  - ☐ H203-1B
- ☐ PowerMate 2
  - ☐ Model H500B
  - ☐ Model H501B
  - ☐ Model H502B
  - ☐ Model H503B
- ☐ PowerMate 386
  - ☐ Model H600B
  - ☐ Model H601B
  - ☐ Model H602B
  - ☐ Model H603B
- ☐ PowerMate 386/20
  - ☐ H601E-1B
  - ☐ H603E-1B
  - ☐ H605E-1B
  - ☐ H606E-1B
- ☐ PowerMate Portable
  - ☐ APC-H701
  - ☐ APC-H702
- ☐ MultiSpeed
- ☐ MultiSpeed EL
- ☐ MultiSpeed HD

Nokia Data
- ☐ Nokia PC286
- ☐ Nokia WS286
- ☐ Nokia TT/286
- ☐ Nokia WS386
- ☐ Nokia TT/386

Olivetti
- ☐ M280
- ☐ M240
- ☐ M250
- ☐ M290
- ☐ M380 Family
- ☐ M380XP Family

PC's Limited
See Dell
- ☐ PC's Limited 286

Samsung
- ☐ S300
- ☐ S500
- ☐ S5000
- ☐ S5100

Sharp
- ☐ PC-4500 Series
  - ☐ Model 4501
  - ☐ Model 4502
  - ☐ Model 4521
- ☐ PC-7000A/7000 Series
  - ☐ Model 7000A
  - ☐ Model 7100
- ☐ PC-7200 Series
  - ☐ Model 7202
  - ☐ Model 7221
  - ☐ Model 7241

Sun
- ☐ Sun 4/100 Family
- ☐ Sun 4/200 Family
- ☐ Sun 3/50
- ☐ Sun 3/60
- ☐ Sun 3/100 Family
- ☐ Sun 3/200 Family
- ☐ Sun386i Family

Tandon
- ☐ PCX
  - ☐ Model PCX-2
  - ☐ Model PCX-20
- ☐ PCA
  - ☐ Model PCA-1
  - ☐ Model PCA-20
  - ☐ Model PCA-40
  - ☐ Model PCA-70
- ☐ PCA Plus
  - ☐ Model PCA-20 Plus
  - ☐ Model PCA-40 Plus
  - ☐ Model PCA-70 Plus
- ☐ Targa
  - ☐ Targa 20
  - ☐ Targa 40
- ☐ Targa Plus
  - ☐ Targa 20 Plus
  - ☐ Targa 40 Plus
- ☐ PAC 286
- ☐ PAC 286 Plus
- ☐ 386

Tandy
- ☐ Model 1000SL
- ☐ Model 1000TL
- ☐ Model 1000TX
- ☐ Model 1400LT
- ☐ Model 3000
- ☐ Model 3000HL
- ☐ Model 3000NL
- ☐ Model 4000
- ☐ Model 4000LX

Tatung
- ☐ TCS-4000
- ☐ TCS-7000
- ☐ TCS-8000

TeleVideo
- ☐ Telecat 286
  - ☐ Model FL
  - ☐ Model 101
  - ☐ Model 40
  - ☐ Model ND
- ☐ Tele/386
  - ☐ Model NH
  - ☐ Model 40
- ☐ TeleOAS I
- ☐ TeleOAS II
  - ☐ Model NH
  - ☐ Model 20
- ☐ TeleOAS III
  - ☐ Model NH
  - ☐ Model 40
  - ☐ Model 70
- ☐ TeleOAS III/20
  - ☐ Model NH
  - ☐ Model 40
  - ☐ Model 70
- ☐ TeleVideo 9xx Family

Texas Instruments
- ☐ Business Pro

Toshiba
- ☐ T1000
- ☐ T1100 Plus
- ☐ T1200
- ☐ T3100/20
- ☐ T3200
- ☐ T5100

Unisys
- ☐ PW2
- ☐ Series 308
- ☐ Series 500
- ☐ Series 800
  - ☐ 800/16
  - ☐ 800/20
- ☐ Series 850

Victor Technologies
- ☐ VPS IIC
  - ☐ 2691M-1
  - ☐ 2692M-1
  - ☐ 2693C-1
- ☐ VPC 250
  - ☐ 2721M-1
  - ☐ 2721C-1
  - ☐ 2722M-1
  - ☐ 2722C-1

Wang
- ☐ Laptop Computer
- ☐ PC 240
  - ☐ PC 240-1
  - ☐ PC 240-2
  - ☐ PC 240-3
- ☐ PC 280
  - ☐ Model PC 280-1
  - ☐ Model PC 280-2
  - ☐ Model PC 280-3
- ☐ PC 380
  - ☐ Model PC 380-1
  - ☐ Model PC 380-2
  - ☐ Model PC 380-3

Wyse
- ☐ PC 286 Model 2108
- ☐ PC 286 Model 2112
- ☐ PC 286 Model 2200
- ☐ PC 286 Model 2214
- ☐ PC 386 Model 3216
- ☐ Wyse 30
- ☐ Wyse 50
- ☐ Wyse 60

Zenith
- ☐ Z-159
  - ☐ Model 2
  - ☐ Model 3
  - ☐ Model 12
  - ☐ Model 13
- ☐ Z-248
  - ☐ ZF-248-81
  - ☐ ZF-248-82
  - ☐ ZF-248-84
- ☐ Z-286
  - ☐ ZF-286-02
  - ☐ ZF-286-23
  - ☐ ZF-286-25
- ☐ Z-386
  - ☐ Model 40
  - ☐ Model 80

MINICOMPUTERS

AT&T
- ☐ 3B Series

Data General
- ☐ ECLIPSE MV/Family
  - ☐ MV/1400 DC
  - ☐ MV/2000 DC
  - ☐ MV/7800 DCX
  - ☐ MV/2000 DC
  - ☐ MV/7800 XP
  - ☐ MV/15000
    - ☐ Model 8
    - ☐ Model 10
    - ☐ Model 20
  - ☐ MV/20000
    - ☐ Model 1
    - ☐ Model 2

Digital Equipment Corp.
- ☐ DEC MicroVAX 2000
- ☐ DEC MicroVAX 3500
- ☐ DEC MicroVAX 3600
- ☐ DEC MicroVAX II
- ☐ DEC VAX 6200
- ☐ DEC VAX 6210
- ☐ DEC VAX 6220
- ☐ DEC VAX 6230
- ☐ DEC VAX 6240
- ☐ DEC VAX 8250
- ☐ DEC VAX 8350
- ☐ DEC VAX 8530
- ☐ DEC VAX 8550
- ☐ DEC VAX 8700
- ☐ DEC VAX 8800 Series
  - ☐ DEC VAX 8810
  - ☐ DEC VAX 8820
  - ☐ DEC VAX 8830
  - ☐ DEC VAX 8840
  - ☐ DEC VAX 8842
- ☐ DEC VAX 8974
- ☐ DEC VAX 8978
- ☐ DEC VAX 11/700 Series
  - ☐ DEC VAX 11/725
  - ☐ DEC VAX 11/730
  - ☐ DEC VAX 11/750
  - ☐ DEC VAX 11/780
  - ☐ DEC VAX 11/785

Gould
- ☐ MPX

Harris
- ☐ H Series
  - ☐ H800
  - ☐ H500
  - ☐ H700
  - ☐ H800
  - ☐ H900
  - ☐ H1000
  - ☐ H1200
  - ☐ H1500
  - ☐ H1600
- ☐ Harris HCX5
- ☐ Harris HCX5
- ☐ Harris HCX7
- ☐ Harris HCX9

Hewlett-Packard
- ☐ HP 3000 Family
  - ☐ Micro 3000 LX
  - ☐ Micro 3000 GX
  - ☐ Micro 3000 XE
  - ☐ Series 70
  - ☐ Series 925
  - ☐ Series 925 LX
  - ☐ Series 935
  - ☐ Series 950
  - ☐ Series 955
- ☐ HP 9000 Family
  - ☐ Model 319
  - ☐ Model 320
  - ☐ Model 330
  - ☐ Model 350
  - ☐ Model 360
  - ☐ Model 825
  - ☐ Model 835
  - ☐ Model 840
  - ☐ Model 850
  - ☐ Model 855

Honeywell Bull
- ☐ DPS 6 +
  - ☐ 200 Series
    - ☐ Model 200
  - ☐ 210 Series
    - ☐ Model 211
  - ☐ 220 Series
    - ☐ Model 221
  - ☐ 400 Series
    - ☐ Model 402
    - ☐ Model 403
    - ☐ Model 404
  - ☐ 410 Series
    - ☐ Model 412
    - ☐ Model 413
    - ☐ Model 414
  - ☐ 420 Series
    - ☐ Model 422
    - ☐ Model 423
    - ☐ Model 424
  - ☐ XPS 100 Series
    - ☐ X15
    - ☐ X22
    - ☐ X42

IBM
- ☐ Application System/400
- ☐ Series 1
- ☐ System/36
- ☐ System/38
- ☐ System/88
  - ☐ 4575 Processor Model 20B
  - ☐ 4576 Processor Model 40
  - ☐ 4576 Processor Model 50
  - ☐ 4576 Processor Model 60
  - ☐ 4576 Processor Model 81
  - ☐ 4576 Processor Model 82
  - ☐ 4576 Processor Model 83
  - ☐ 4576 Processor Model 84
  - ☐ 4576 Processor Model 85
  - ☐ 4576 Processor Model 86

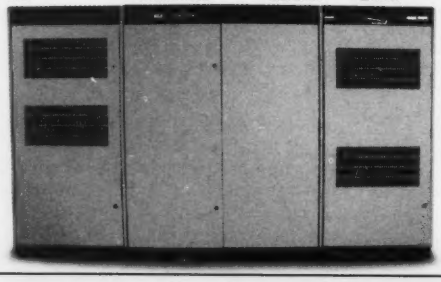
ICL
- ☐ DRS 300

Intergraph
- ☐ CLAN
- ☐ 200
- ☐ 250
- ☐ 252
- ☐ 350
- ☐ Micro II

NCR
- ☐ Tower Family
  - ☐ NCR mini Tower
  - ☐ NCR Tower Series
    - ☐ 32/200
    - ☐ 32/400
    - ☐ 32/450
    - ☐ 32/600
    - ☐ 32/650
    - ☐ 32/800
    - ☐ 32/850

Nixdorf
- ☐ Targon Family

Olivetti
- ☐ LSX 3000 Series



Prime
- ☐ 386 EXL Series
  - ☐ EXL 316
  - ☐ EXL 320
  - ☐ EXL 325
- ☐ 50 Series
  - ☐ Tower Systems
    - ☐ Model 2350
    - ☐ Model 2450
    - ☐ Model 2455
  - ☐ 4000 System
    - ☐ Model 4050
    - ☐ Model 4150
    - ☐ Model 4450
  - ☐ 6000 System
    - ☐ Model 6150
    - ☐ Model 6350
    - ☐ Model 6550

Tandem
- ☐ NON-STOP II
- ☐ TXP
- ☐ CLX

Unisys
- ☐ 5000 Series
  - ☐ 5000/35
  - ☐ 5000/55
  - ☐ 5000/85
  - ☐ 5000/95
- ☐ 6000 Series
  - ☐ 6000/50
- ☐ 7000 Series
  - ☐ 7000/30
- ☐ 7000/40
- ☐ 7000/50
- ☐ 7000/S1
- ☐ 7000/S2

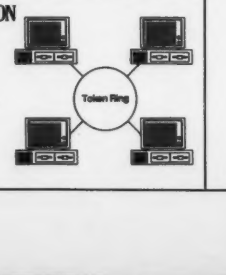
Wang
- ☐ VS 5000
- ☐ VS 5400
- ☐ VS 5430
- ☐ VS 5440
- ☐ VS 5450
- ☐ VS 5460
- ☐ VS SE
- ☐ VS 6E
- ☐ VS 75E
- ☐ VS 7100
- ☐ VS 7110
- ☐ VS 7120
- ☐ VS 7150
- ☐ VS 7310
- ☐ VS 7320
- ☐ VS 5
- ☐ VS 6
- ☐ VS 15
- ☐ VS 25
- ☐ VS 45
- ☐ VS 65
- ☐ VS 85
- ☐ VS 90
- ☐ VS 100

OPERATING SYSTEMS

- ☐ DOS
  - ☐ MS-DOS
  - ☐ PC-DOS
  - ☐ NCR-DOS
- ☐ ProDOS
  - ☐ VectraDOS
  - ☐ OS/2
  - ☐ GCOS 6
- ☐ GCOS 7
- ☐ GCOS 8
- ☐ Macintosh
- ☐ MVS
- ☐ PRIMOS
- ☐ ULTRIX
- ☐ UNIX
- ☐ VM
- ☐ VMS
- ☐ XENIX

TRANSMISSION MEDIA

- ☐ Broadband
- ☐ Fiber Optic
- ☐ LocalTalk
- ☐ Microwave
- ☐ Public Data Network
- ☐ Satellite
- ☐ T1
- ☐ Thick Ethernet
- ☐ Thin Ethernet
- ☐ Token Ring
- ☐ Twisted Pair



AS YOU'D LIKE.

PERIPHERALS

Boards
- AboveBoard
- High Page
- IBM Token Ring Adapter Card

AST
- Turbolaser P/S

- Laserwriter
- Laserwriter II NT
- Laserwriter NT
- Laserwriter Plus

- ProWriter C715
- ProWriter Jr. +
- StarWriter D10
- Jetsetter Laser

Citizen
- 120-D

- MSP-55
- Premiere 35
- Tribute 124
- Tribute 224

Diablo
- 630 API
- Advantage D25

Epson
- DFX5000
- EX800
- FX1050
- FX286E
- FX850
- L1000
- LQ Series
  - LQ1050
  - LQ2500
  - LQ2550
  - LQ500
  - LQ850
  - LQ950
- LX800
- MX Series
- RX Series

Fujitsu
- DX7100
- DX7200
- DX7300

Hewlett-Packard
- LaserJet
- LaserJet Model 2
- LaserJet 2000
- LaserJet 500+
- LaserJet+
- LaserJet Series II
- ScanJet
- Deskjet
- HP 7475A Plotter
- HP 7550A Plotter

IBM
- ProPrinter

NEC
- LC860
- LC890
- P6 Pinwriter
- P7 Pinwriter
- P5XL Pinwriter
- P2200 Pinwriter

Okidata
- Laserline 6
- Microline 192 Plus
- Microline 193 Plus
- Microline 232
- Microline 293

- Microline 393

Panasonic
- KX-P1080i
- KX-P1091i
- KX-P1092i

Star Micronics
- ND15
- NR10
- NR15
- NX1000
- NX15

Toshiba
- PageLaser
- 321 SL
- 341 SL
- 351 SX
- 351 C-2

Xerox
- Model 8044
- Model 4045
- Model 4075
- Model 4090
- Model 8700
- Model 8790
- Model 9700
- Model 9790

Telecommunications

Amdahl
- 470X Communications Processor
- 4725
- 4725E
- 4745

Digi-Link
- Model DLS5TY-01BC

Hayes
- Smartmodem 2400
- Smartmodem 1200
- V Series 9600
- Personal Modem

IBM
- 3720 Communication Controller
- 3721 Expansion Unit

- 3725 Communication Controller Model 1
- 3725 Communication Controller Model 2
- 3728 Communication Control Matrix Switch
- 7170 Device Attachment Control Unit (DACU)
- 7171 ASCII Device Attachment Control Unit

- 7426 Terminal Interface Unit
- 7427 Console Switching Unit
- 9736 Integrated Digital Network Exchange Model 20
- 9737 Integrated Digital Network Exchange Model 40
- 9738 Integrated Digital Network Exchange Model 70
- IBM 9751 CBX

Natural Microsystems
- Watson Voice System

Racal-Vadic
- 1200VP
- 1200PA
- 2400VP
- 2400PA Model 2
- 9600VD

Schlitz
- Integrator 1544

Telebit Corp.
- Trailblazer Plus

Ven-Tel
- 18-K

Boards
- InBoard 386
- J-Laser Board
- TinyTurbo 286

Printers, Lasers, Scanners

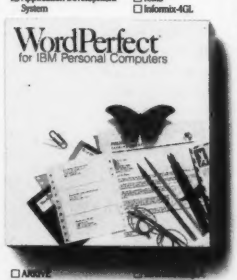
Apple

C. Itoh
- PW 15505+NLQ
- PW 8510S+NLQ
- ProWriter 310
- ProWriter 315

- 180-D
- MSP-15E
- MSP-40
- MSP-45
- MSP-50

APPLICATION SOFTWARE

- 1-2-3
- 1-2-3 Networker
- 4th Dimension
- Ability
- Access/X.25/SDLC/QLLC
- AccountMate
- AccountMate III Plus
- ACCPAC BPI Accounting
- ACCPAC Plus
- Adobe Illustrator
- Advanced Revelation
- Aegis
- AIMS
- AppleLink
- Application Development System
- Freelance Plus
- GEM Desktop
- GEM Draw
- GEM Graph
- GP
- Great Plains
- Harmony
- Harvard Graphics
- Harvard Total Project Manager
- Higgins Group Productivity Software
- High Stepper
- HyperCard
- ICMS
- Informix-4GL
- Microsoft Linker
- Microsoft Project
- Microsoft QuickBasic
- Microsoft Word for Macintosh
- Microsoft Word for the PC
- More!
- MultiMate Advantage II LAN
- Multiplan
- NETmanager—The LAN Support Center
- NETremote—Network Productivity Tool
- NetTime
- Netway 100A/AE
- Network Co-Processor
- NIN
- NINplus
- Nursing Information Network
- O'Hanlon's Data Base Solutions
- OAT OATGATE
- Office Writer
- OMNIS 3 Plus
- Open Access II Network
- Operating Room Information Network
- Orchestrade Series
- ORIN
- OSAS
- PageMaker for the Macintosh
- PageMaker for the PC
- Paradox
- PC Focus
- PC Paint Plus
- PC Watch
- PWS/IDEAS
- Q-Pro 4
- Quattro
- QuickConnect
- QuickSilver
- R&R Relational Report Writing
- R:BASE CLOUT
- R:BASE Extended Report Writer
- R:BASE for DOS
- R:BASE Program Interface (PI)
- R:BASE Runtime
- R:BASE System V
- RDM
- Ready, Set, Go!
- Real World
- Reference Point
- Reflex—the Analyst
- Reflex Plus
- Retail Inventory Control
- Rewrite
- RM/COBOL
- RM/COBOL-85
- RM/Net + 5
- Sales Executive
- Samna Word Plus IV
- SBT Database Accounting Library
- Shoebox 3



- Above
- Asynchronous Communications Server
- AutoCAD
- BABY/36
- BBx Progression/2
- Btrieve
- Btrieve/N
- C Language RPC Compiler
- C-ISAM
- Carbon Copy
- Case Management System
- CC-Assist
- CertiFlex
- Champion III
- ChiLan CS-1 UTS Gateway
- CLC
- Clipper
- Close-Up
- Color Magic
- Condor 3
- Context
- Cricket Draw
- Cricket Graph
- CROSS/POINT
- Crosstalk XVI
- Crosstalk XVI for Networks
- CYMA
- DataEdge
- DataFlex
- DataLex
- dBASE Graphics
- dBASE III Plus
- dBXL
- Direct Net
- DisplayWrite 4
- Distribution Manager
- DT Network
- EasyFiler
- EasyGate
- EasyWriter II
- EGA Paint
- Enable/LAN
- Enrich
- EtherComm
- EtherConnect—LAN Interface for PC SAY
- Eureka: The Solver for the Macintosh
- Eureka: The Solver IBM Version
- Excalibur Plus
- Extended Features
- FailSafe
- File & Find
- Filemaker Plus
- Focal Point
- ForComment: Network Version
- FoxBASE+
- Framework II
- FreeHand
- Freelance
- Informix-SQL
- InfoTrax
- Insurance Writer
- IRMALAN
- Javelin
- JetTax
- KeyEntry III/LAN
- LAN Administrator's Kit
- LAN Shell
- LAN:Datacore
- LAN:DataStore
- Lanscope
- Legal Billing II+
- LinkUp 3270 Gateways
- MacDraw
- Macola
- MacProject
- MacWrite
- Magic PC
- Manufacturing Manager
- MasterDesigner II
- MathPlan
- Maxess SNA Gateway
- Maynstream
- McMax
- MDBS III
- Me2
- Metro
- MICA
- Microsoft Assembler
- Microsoft C Compiler
- Microsoft Chart—Macintosh Version
- Microsoft Chart—PC Version
- Microsoft Excel
- Microsoft Excel for the PC
- Microsoft File
- PC-Anywhere
- PC/TCP Network Software
- PCOX/Gateway—16
- Personal Editor 2 (PE2)
- Personnel Resource Network/Schedule
- PFS:Professional File
- PFS:Professional Network
- PFS:Professional Plan
- PFS:Professional Write
- PlanPerfect
- Platinum
- PLUS78—VIP Terminal Emulation
- Point of Sale for Real World
- Poly-STAR/220 & 240 for DEC LAT networks
- Poly-STAR/220 & Poly-STAR/240
- Power Manager
- PowerBase
- PowerPoint
- PROGRESS
- Project Manager
- Property Management
- Time Line
- Time Line Graphics
- Total Word
- Turbo C
- Turbo Database Toolbox
- Turbo Editor Toolbox
- Turbo Graphix Toolbox
- Turbo Pascal
- Turbo Pascal Database Toolbox
- Turbo Pascal for the Macintosh
- Turbo Prolog
- Turbo Tutor
- Unify
- VALPRTSC
- Vanguard PCB Design System
- Ventura Publisher
- Visastore Deluxe
- ViewStar Pro Series
- Volkswriter Deluxe Plus
- Volkswriter III LAN

- SideKick for the IBM PC
- SideKick for the Macintosh
- SmartCom II
- SNADS Gateway/3+Mail
- Softerm PC
- SQLBase
- SuperCalc
- SuperCalc LanPak
- SuperKey

- SuperPaint
- SuperProject Expert
- SuperProject Expert LanPak
- SURPASS
- Surveyor's Management System
- Symphony
- T3
- TCS Total Accounting System
- TEAM-UP
- TEL
- The Coordinator System
- The Sheduler
- The Smart Software System
- The Spreadsheet Auditor
- Timberline
- Volkswriter Scientific
- Windows
- Windows/386
- WordPerfect
- WordPerfect—Library
- Words & Figures
- WordStar 2000
- WordStar 2000 Plus
- WordStar Professional
- Xtrieve
- Xtrieve Report Writer Option
- XyWrite III
- XyWrite III Plus
- ZIM
- ZyINDEX

PROTOCOLS

- AFP
- Async
- Bisync
- DLC
- HDLC
- OSI
- SDLC
- SMB
- SNA
- TCP/IP
- X.25
- XNS

Take a moment to look over this page.

Anything you check, we can combine into a single, integrated network.

With the flexibility to change as your needs change.

That's because at 3Com we can network more types of systems to more types of systems.

We make over 350 modular networking products. Everything from adapter boards to network operating systems to mainframe connections.

Each one built upon a platform of established industry standards. Making incompatibility virtually a non-issue at any level. Be it corporate, departmental or workgroup.

Now, take a moment to look over your preferred vendor list.

If 3Com isn't on it, maybe you should call 1-800-NET-3Com, Dept. SF.

And check us out.

3Com

We network more types of systems to more types of systems.

©1988 3Com Corporation. 3Com is a registered trademark of 3Com Corporation. All trade names referenced above are the service mark, trademark, or registered trademark of the respective manufacturers.

Net blazers push standards, prod vendors and inspire users

Innovators are taking risks and reaping the benefits

BY ELISABETH HORWITT

The one generalization you can make about pioneers, whether they blaze trails in the wilderness or in corporate networking, is that it is very difficult to make generalizations about pioneers.

Few, if any, of the MIS and communications managers who appear in the following pages resemble your classic pioneering maverick, with steely eyes fixed on the horizon and arrows sticking out of the back.

This is not to say that network innovation is an easy walk down the block. The risks are there.

Sometimes they involve betting the budget on homegrown or untested products.

Tenneco, Inc., for example, became a guinea pig for an early Integrated Services Digital Network (ISDN) setup while the standard was incomplete and supported by only a few vendors. Westinghouse Electric Corp. and Carnegie-Mellon University developed their own communications software because no products fulfilled their needs.

But not all innovators are independent types who scorn vendors' help. Several companies profiled here show themselves to be particularly daring, inventive and determined in the way they extract concessions, special deals and extra effort from the major networking suppliers.

G. D. Searle & Co. was one of several big users whose demands for more effective DEC-to-IBM links influenced Digital Equipment Corp. and IBM to provide such products.

Westinghouse brought in technicians from several major networking vendors to cooperate with its own people in the development of a multivendor network management system.

Carnegie-Mellon built its distributed networking system, Andrew, with a lot of assistance — and funding — from IBM.

The U.S. Navy has been a major force behind recent efforts to develop high-speed fiber-optic networking standards, which it wants to use as the basis for its battleship networking system.

Yet not all innovation is technology-driven. In several cases, the real challenge came from users, who were less predictable and malleable than the networking systems being developed.

M. W. Kellogg Co. and Pacific Gas & Electric Co., for example, both used off-the-shelf networking products. But Kellogg's MIS staff struggled through an arduous trial-and-error process before it developed an effective user support system on its local-area networks. Pacific Gas expended a great deal of time in creating a multilevel security system for network access.

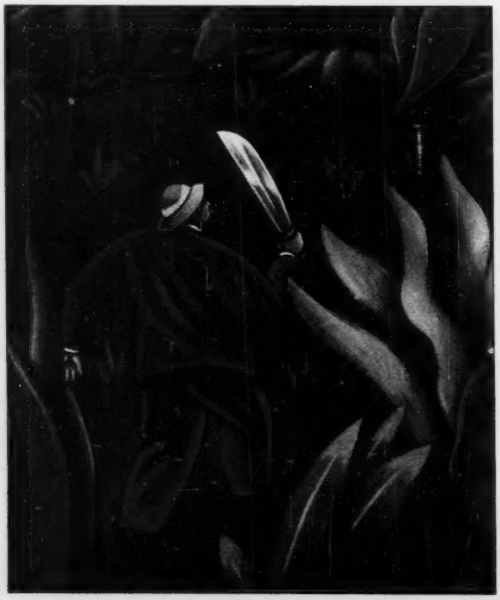
Users' reluctance to give up tried-and-true business routines often causes more trouble than the technical challenges. When Levi Strauss & Co. decided to deploy electronic data interchange (EDI) links to its retailers, it had less trouble finding the right EDI service than getting retailers to adopt a new way of doing business. When Citytrust Bancorp, Inc. implemented a PC-based front end for its executives to access mainframe data, its biggest problem was developing applications to tempt users to accept the system.

Despite the risk, frustrations and expense innovators encounter, they all seem to think the payback is worth the trouble.

Sometimes the rewards take the form of hard dollar savings. ISDN is already saving Tenneco big bucks on wiring costs by putting both voice and data on the same twisted-pair wiring system. Weyerhaeuser Co. expects major savings in production costs from a computer-integrated manufacturing (CIM) system at one of its pulp plants.

Important benefits

Key benefits that may be hard to quantify include giving employees faster, easier access to the information they need to do their jobs better. In other cases, service representatives can give more personalized service with account information at their fingertips. Executives make more timely decisions if they don't have to wait for MIS to deliver the data. Work groups cooperate better if they can share information electronically.



Often, being innovative saves a firm a lot of trouble and, possibly, a costly system upgrade or redesign. For example, the Navy hopes that the fiber-optic networks it is installing on its ships will fill its communications needs for the next 20 years.

Conversely, Weyerhaeuser's pulp plant let almost two decades pass by between its first major technological innovation and its second. As a result, it had to put up with outdated equipment and frequent network crashes until its systems people could decide on the next step to take.

Weyerhaeuser's New Bern, N.C., plant did not deliberately set out to install a state-of-the-art system; its initial aim was to beef up an overburdened network and find a replacement for a computer that IBM was not going to support much longer.

But once the firm's MIS managers started examining their factory's information technology, they ended up developing a leading-edge CIM system. And they had their reward in the form of better responsiveness to customer needs, lower production costs and the ability to pinpoint potential problems in the plant within hours instead of days.

MIS managers such as those at Weyerhaeuser, who become innovators almost by accident, typify today's networking pioneer far more than the more idealized maverick. While such a venture is risky, many managers begin blazing trails because sticking to the well-worn path can be even more dangerous.

Corporate MIS departments are starting to demand creative network solutions now that they view communications systems as strategic assets rather than utilities. Steering a "safe" middle course has become next to impossible, given the volatility of the regulatory environment and networking marketplace.

Not that the innovators profiled here are all conservative folks who were forced into the innovator mode by circumstance. On the contrary: One of their main claims to the title "networking pioneer" was their willingness to go that extra mile for exactly the right answer to their company's networking needs — even it takes them into uncharted territory. •

Horwitt is a *Computerworld* senior editor, networking.

Lacking products, Westinghouse rolls its own intelligent net management

BY ARIELLE EMMETT

Subsidiary develops AI-based network management tools

When Westinghouse Electric Corp. implemented its first T1 link in 1983, telecommunications managers decided to take aggressive control of the firm's private network.

"When we started to develop the network management system a couple of years ago, there was nothing out there to do the job," says Thomas J. O'Toole, manager of telecommunications systems at Wescor, the recently formed Westinghouse communications subsidiary in Pittsburgh. "So we have a 'roll your own' network. We've provisioned it ourselves, and it has been much more cost-effective." Now, Wescor plans to market its homegrown products and experience in network management.

Wescor's network control centers monitor a wide variety of transmissions, including voice, facsimile and video, as well as packet-switched, dial-up and dedicated links for data. The company is developing artificial intelligence-based network management tools. These products were designed to provide such services as network surveillance and maintenance, performance monitoring and, eventually, system diagnostics.

Surveillance and alarm data are communicated from the switches back to a central AT&T 3B2 600 computer, which converts everything into a common alarm format.

Managing its own network rather than using vendor services has brought Westinghouse both increased reliability and cost savings, according to Brad Magill, Wescor's manager of corporate data operations. Voice and data networks are running with 99.7% to 99.8% availability, he says.

O'Toole affirms that reduced costs exceed $50,000 per month. "If you take a look at all the services we provide over the network and compare them with commercial services, millions of dollars are saved each year," he claims.

The other side of the coin is that Wescor has had to invest heavily in software engineering and manpower to make the networks viable. "Our software engineering alone will cost us in the seven-figure range," O'Toole says. Training operations people and providing staffing for 24-hour network monitoring also has been expensive, according to Magill.

"We have invested a reasonable amount in our network management system over the years, but we definitely feel [the outlay] will come back to us," O'Toole says. One direct payback is cost avoidance; by fixing things before they break, the system minimizes the use of a higher-priced service while a link is being repaired.

Another payback comes from users. "Network downtime costs money," O'Toole explains. "While some of our divisions see the network as a commodity and just want more bang for the buck, for others, it supports their products."

For example, Westinghouse Broadcasting Co. uses the network to access information on current prices and availability of time slots. "If they sell something that isn't available, they lose the sale; if they sell at the wrong price, they lose the profit," O'Toole says.

In addition, Wescor hopes to use its network management system to differentiate its new network service from competitive offerings, O'Toole notes. It is also positioning itself as a value-added carrier and has already signed up two outside companies. A reliable, well-managed network is a key selling point, he says.

Wescor's 20-person network operations staff has been able to pick up 54% of all trouble spots on the network before any customer has complained, according to Jim Sever, manager of quality and reliability for voice services at Wescor. "We clear 55% to 60% of all trouble on the voice and data network in less than four hours," he says.

Substantial savings

The company also hopes to maximize staff efficiency by managing unmanned remote sites from a central location. This move could save as much as $10,000 per network node each month, Sever reports.

The heart of the centralized network management system is a common relational database that keeps track of components on Wescor's voice network. The database, linked via a network interface to the alarm system, stores constantly updated information on network topology, equipment installed and in inventory, event logs, vendor information and trouble tickets. Separate subsystems linked to the database and the network perform call detail analysis, quality assurance testing and traffic and switch management.

The network is complicated by the presence of multivendor equipment, including private branch exchanges from AT&T, IBM subsidiary Rolm Systems and Northern Telecom, Inc.

"If we had had an all-IBM solution to our network, we could have used Netview and Netview/PC for management," Sever says. But the network's multivendor nature forced Westinghouse to come up with its own artificial intelligence-based solutions.

SNAPSHOT

Challenge: Increase reliability and cut costs of managing a multivendor, T1 network despite a lack of products.

Response: Develop in-house, AI-based network management system; get vendors to cooperate.

According to Sever, Wescor is implementing three levels of AI in stages. The first level filters out alarms, invokes rules to determine problems and generates a report. The second level performs trend analysis and generates reports using additional network information from the alarm system. The third level, which has not yet been implemented, is intended to pinpoint problems by sending commands to alarm sources to perform diagnostic tests.

A filtering system identifies major alarms, then activates a paging function to contact a network analyst directly. Automatic trouble tickets are then issued to vendors. Quite often, troubles on the network are reported directly to vendor representatives, who are on-site and work cooperatively with Wescor's own network analysts to solve the problem.

Vendors have become active participants or "network advocates" in Westinghouse's management program. "We've partnered with our vendors," O'Toole says. "If you go into our network control center, you'll find that half the people aren't Westinghouse employees; they work for AT&T, MCI and U.S. Sprint. Because we do it this way, things get fixed faster." •

Emmett is a free-lance writer and editor in Hewitt, N.J.

Wescor's *Sever (left) and O'Toole combine to solve system problems*

BILL CAMPBELL/PICTURE GROUP

Wary Citytrust loan officers gain easier mainframe access from PCs

Stressing account management over loan processing

BY RICARDO DOBSON

Citytrust Bancorp, Inc. was looking for a micro-to-mainframe link that went a long way beyond simple terminal emulation. The Bridgeport, Conn., holding company wanted to provide loan officers using IBM Personal Computers with easy access to customer records on the IBM mainframe so that they, in turn, could provide more effective, individualized customer support.

As a result, Briant Wolfe, a Citytrust vice-president, faced the classic MIS problem of guiding a nontechnical professional through the intricacies of mainframe communications and database access. Getting the PC to act like an IBM 3270 terminal was the least of Wolfe's worries.

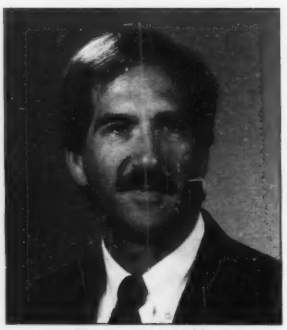
The current system forced users to navigate through multiple mainframe applications just to respond to routine banking questions. In order to access data, they had to learn different input requirements for each application as well as decipher cryptic reports targeted more at saving screen space than easy understanding for occasional users, Wolfe says. "For the less-than-frequent user, it was almost impossible to use the mainframe," he says.

Citytrust hoped that easier access to bank records would allow officers to practice a marketing-oriented strategy that stresses profitable account management over merely processing loan applications. For example, an officer could review bank records to identify high-potential customers for a new bank service or to analyze the profitability of ongoing bank relationships. It could also enable officers to reinforce bonds with their clients through the delivery of timely information, Wolfe reports.

These goals started Wolfe on his search for a PC-style front end to guide officers through mainframe banking files and applications. After looking at about a dozen candidates, he chose Enter/3270, a software package from Aspen Research, Inc.

Enter/3270 is a micro-to-mainframe package that runs on an IBM PC and works with a variety of terminal emulation and IBM LU6.2 communications products. It develops applications intended to guide nontechnical users through mainframe databases using a series of Help screens, lists and pop-up menus.

Alan Parnass, Aspen's president, tailored the package to the software currently in use on Citytrust's IBM 4381 — IBM's Integrated Banking Application and Mortgage Loan System from Kirchman Corp.



Citytrust's Wolfe

One part of the bank's Integrated Banking Application system is a Customer Information application that provides a central database of customer account data.

A second application, developed on the Mortgage Loan System, accesses information on customers' mortgage accounts.

A third mainframe application, Infogram, was developed internally by the bank. It shows current rates on loans, certificates of deposit and savings accounts. Bank officers need constant access to Infogram to provide timely, accurate information to their clients.

Under the old system, bank officers had to depend on the MIS department to get the information they needed. This effectively prevented them from doing ad hoc queries during a customer service call.

To solve this problem, Wolfe used Enter/3270 to develop Citytrust Executive Information, an application that is designed to insulate users from many irksome conventions of the mainframe such as logon procedures.

The application also takes care of accessing data across different files. Users can select from a menu the relationship, account profile or marketing information they require.

The application is used to integrate information from both the Customer Information and Mortgage Loan databases, which can be called up on different windows and collated. User queries sometimes require linking information between the two mainframe databases, Wolfe says. Less relevant information is automatically deleted to leave screens less cluttered. Mainframe code is translated to less technical language. The system also generates hard copy reports with contents that span several mainframe screens.

UNDER THE old system, bank officers had to depend on the MIS department to get the information they needed. This effectively prevented them from doing ad hoc queries during a customer service call.

The Executive Information System was deployed at two sites. One is a headquarters staff office in which personnel gather data to support profitability analysis. The other is a branch office.

The early period of use taught Wolfe what information bank personnel regularly accessed and what was rarely referenced.

The system got mixed reviews. Branch managers, who primarily ran word processing on their PCs, complained they had difficulty moving from PCs to the mainframe. The branch had previously implemented Digital Communications Associates, Inc.'s Irma 3270 terminal emulation boards, which allowed branch users to hot-key to and from traditional mainframe applications and their word processing software. But moving between word processing and Enter/3270 required saving files and exiting one application, then starting up the other.

Also, some managers who already knew how to use the traditional mainframe applications were reluctant to learn a whole new set of commands. The application is "helpful for people who don't use the mainframe every day but less helpful for everyday users," says Ed Boyle, supervisor of the relationship profitability department.

Another, more serious problem Wolfe's application faces is the fact that terminals are still in wide use at the bank, and Enter/3270 requires a PC. Wolfe and others are still evaluating to what extent and how soon terminals will be replaced with PCs throughout the firm.

However, the application showed its worth among less frequent users who found it hard to master the intricacies of mainframe access. Boyle is particularly impressed by the application's ability to "put it in English instead of requiring users to learn lots of commands." He also likes the clarity with which the software showed links between customers as well as the common front end it provided for Customer Information and mortgage loan applications.

To promote use of the new system, Wolfe is planning to introduce it on a newly developed mainframe application called Profitability System. This application will allow officers to determine which banking relationships and other factors significantly affect their portfolios' profitability.

Since this application is new, employees will be using Executive Information System commands from the start, and no relearning will be required. •

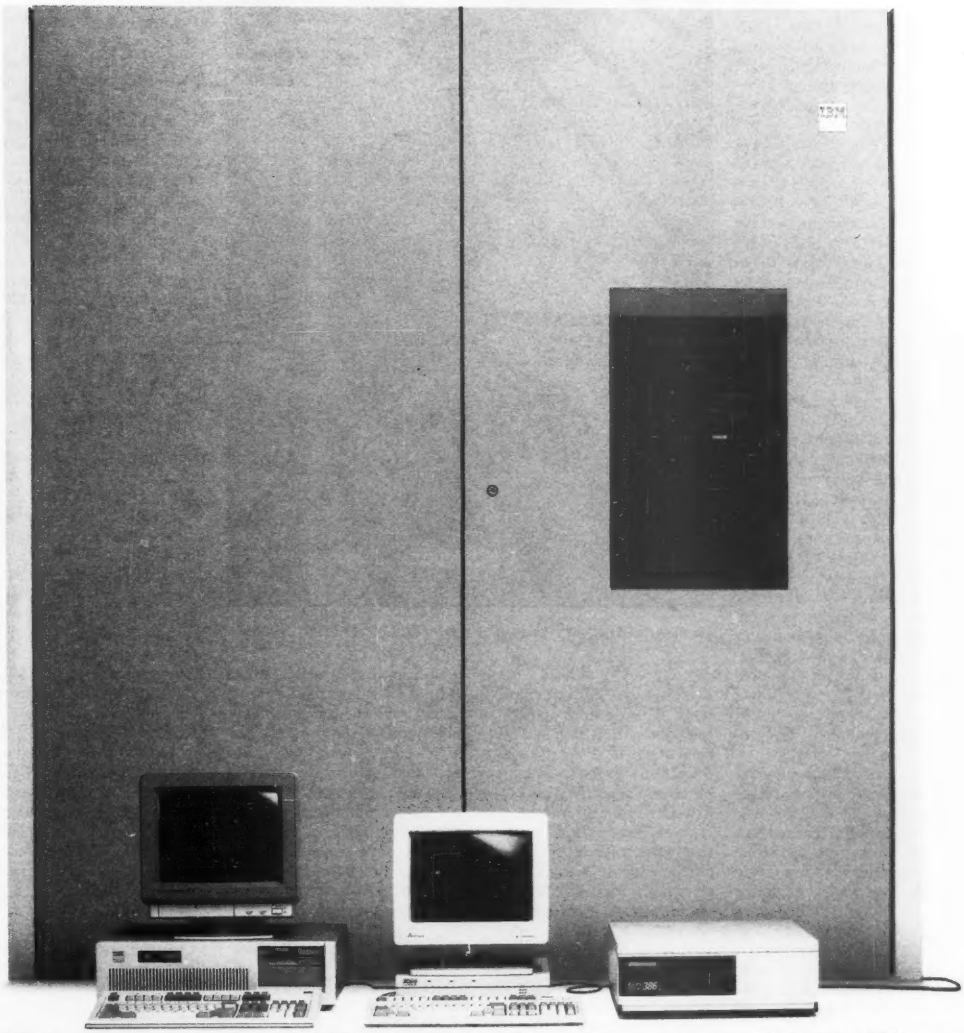
SNAPSHOT

Challenge: Let loan officers with PCs access mainframe customer records for more effective customer support.

Response: Create a tailored micro-to-mainframe system that guides managers to the right data.

Dobson is a trainer/consultant in Louisville, Ky., specializing in Ashton-Tate's Symphony, Lotus' Freelance Plus, DOS and HP's Laserjet.

LAN TO IBM IS NBD.



No Big Deal.

Now, 3Com has a number of ways to combine local workgroup flexibility with the power and resources of corporate IBM® SNA networks.

There's the Maxess™ SNA Gateway. It lets PCs and workstations on Ethernet or Token Ring run your existing 3270 applications as well as the new distributed applications. No small feat.

And the new MultiConnect™ products will keep both your walls and sanity intact by running Ethernet over existing twisted pair or 3270 coax cabling.

All of which connect beautifully with the hundreds of other products 3Com offers for Ethernet and Token Ring networks. From adapter boards all the way to 3+Open™ LAN Manager, the first completely open network operating system.

So give us a call. The best time to find out about networking your LAN to IBM is NOW.

3Com®

We network more types of systems to more types of systems.™

3Com, 3+Open and MultiConnect are trademarks of 3Com Corporation. Maxess is a trademark of Communications Solutions, Inc., a 3Com division. IBM is a registered trademark of International Business Machines Corporation.

Carnegie-Mellon forges standard look for multivendor net

BY ARIELLE EMMETT

When Carnegie-Mellon University (CMU) in Pittsburgh began to buy up personal computers, minicomputers and workstations in the early 1980s, university computer scientists decided to ward off impending anarchy by revamping the campus communications network.

"What we wanted to do was provide coherent growth to the decentralized computing environment," says John Leong, CMU's director of networking and computing services. "We realized that if we didn't do something, the computing environment would become chaotic."

However, the scientists found few commercial products to help them create the system they envisioned: a network that would preserve the autonomy and multivendor diversity of various computer installations, yet allow users to exchange electronic mail and share files and applications transparently. So CMU set out to develop its own network workstations, software and cabling, with a little help from IBM.

Today, the university operates one of the most mature distributed file system in the country, one that features multimedia electronic mail, a network joining dozens of smaller local-area networks, a programmer's tool kit as well as an advanced workstation that may serve as a prototype for other universities.

Named after the two university founders, Andrew Carnegie and Andrew Mellon, the network has gradually changed how academic work is done. Professors and students now swap messages and homework day or night on any of 1,000 diverse computers and workstations.

Composition students write and annotate their texts using Andrew's hypertext application, and history students make complex analyses of U.S. migration patterns by generating maps based on census data entered into a program called The Great American History Machine.

As a distributed file and electronic mail system, Andrew supports 25 different network servers around campus — storage vaults for workstation files providing as much as 30G bytes of capacity — as well as diverse hardware and software applications. The network integrates computers from Digital Equipment Corp., IBM, Sun Microsystems, Inc., Symbolics, Inc., Apple Computer, Inc. and Cray Research, Inc. Transmission Control Protocol/Internet Protocol helps address the connectivity nightmare, along with new concepts of file distribution, giving users some control over resources. To develop Andrew, IBM and Carnegie-Mellon established the CMU Information Technology Center in late 1982, a project costing each institution more than $3.5 million per year. IBM contributed equipment grants and senior programming talent. Carnegie-Mellon provided personnel and expertise. Priorities for Andrew included:

- A network to interconnect departmental systems, mainframes and workstations.
- A distributed file system enabling students and faculty to access information transparently.
- A beefed-up authentication system.
- An E-mail system that would transmit text, graphics, spreadsheets and even animated images across the network.
- A separate workstation component featuring advanced graphics and a window manager.

CMU wanted a file system that would link as many as 10,000 workstations and provide a view of the file system typically found only on a mainframe, explains Alfred Spector, the university's Information Technology Center director. "Nothing existed before to connect so many machines together," he says.

In 1983, network technicians began rewiring every room on campus. The $5 million job, jointly undertaken with IBM, included a fiber-optic backbone to provide maximum bandwidth for video, data and voice. Within buildings, it incorporates the IBM cabling system.

"No two buildings have the same wiring," Leong says. "Independently, we've built a set of network servers supporting all the existing campus LANs." The LANs include Ethernet, IBM's Token-Ring, Apple's Appletalk and Synoptics' Lattisnet. The servers also support a large network of asynchronous terminals. This strategy helps maintain departmental computing autonomy while providing access to files and programs campuswide.

Once the communications infrastructure was in place, however, the problem of developing a true distributed file system became vexing. "No file-server system has really been designed for workstations on this scale," Leong says. At present, Andrew connects IBM RTs, DEC Microvaxes and Sun workstations.

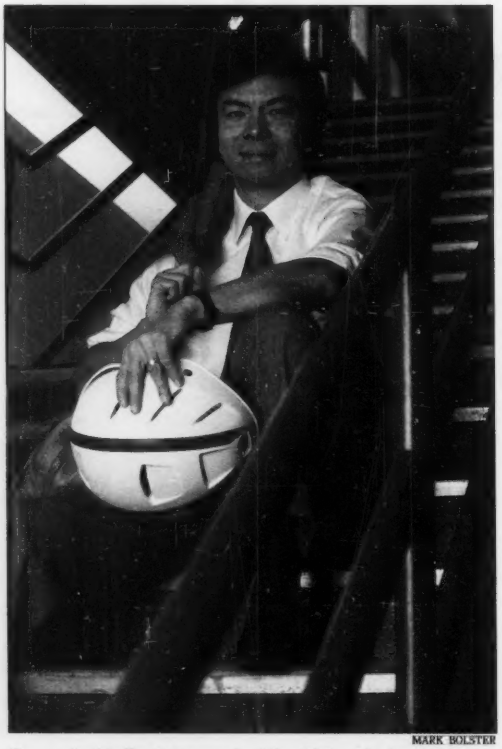
Distribution decisions

One of the first questions to resolve was how to distribute responsibility on the network among file servers and workstations. CMU decided to let the workstations handle applications processing and the majority of networking and operating system chores, leaving the network of file servers to act as remote storage centers.

"From the user's point of view, network access is totally transparent," Leong says. "You don't know where the server is physically located. All you need is a log-in code, and you can access your files from anywhere."

Network architects enhanced security by adding access control features to standard Unix protection mechanisms. Unix was chosen because of its portability across multiple computer platforms, according to Spector. CMU plans to incorporate MIT's Kerberos authentication system in its file system.

"Basically we built an authentication system so that nobody trusts anybody," Leong explains. "The workstation doesn't trust the file server, and



MARK BOLSTER

Carnegie-Mellon's Leong *is riding high on Andrew's success*

SNAPSHOT

Challenge: Provide campuswide file exchange and data access despite a hodgepodge of vendors' systems.

Response: Develop software internally that standardizes user interfaces, E-mail and access across networked systems.

Emmett is a free-lance writer and editor in Hewitt, N.J.

the server doesn't trust the user." Encrypted tokens must be exchanged back and forth between workstation and server before the user gets access to his or her files.

The robustness of Andrew's security system was tested last November, when a virus visited academic and research institutions linked by the Internet wide-area network. The virus did not get past the "very careful programming" of systems designer Craig Everhart, Spector says.

"Some of Andrew's software got overloaded when it detected and rejected a huge number of anomalous network messages. You could say it gagged on them," Spector recalls.

This caused some network degradation and system failures, but while the virus got at systems in other parts of the university, it never affected files or messages on Andrew, he says.

The Andrew distributed file system has gone through three major "cuts" in its six-year development, Leong says. The first cut, a prototype, was a shot in the dark. "It was not great — we built it and threw it away," he says. "Response time was terrible, and quite often we couldn't tell whether we had a networking or workstation problem on our hands."

CMU introduced a new concept of administrative control called Cellular Andrew File System, which permits each university department to maintain control over the file servers holding its users' data. For instance, a universitywide cell, representing access to information or bulletin boards on university servers, would be open to everyone, while a computer science department cell might be restricted to students in that department.

Catching on

The cellular concept has become so popular that Carnegie-Mellon is working with several other universities to develop a national distributed file system. "We believe we can use Andrew to connect parts of organizations in remote places as well as different organizations," Spector says. "That's a happy and exciting result of our work which we hadn't anticipated in 1982 when we got started."

The Andrew E-mail system is built on existing networks on campus, including the Department of Defense's Arpanet, Bitnet and the National Science Foundation's NSFnet. The mail system is multimedia, enabling students to send images and drawings as well as financial data and text. It also departs from traditional E-mail structure by providing secure access to a central mail depository.

"The delivery system permits you to read your mail from any system in the environment in a secure fashion," Spector says.

Electronic addresses are automatically "stamped" when the sender calls up the name of the recipient on the system. "This encourages people to reply a lot more," Leong says. Mail transport to the outside world is handled through standard X.400 or simple mail transfer protocols.

Despite the successes, Andrew has had its share of problems. Applications development has been slower than expected, especially for educational applications, according to software developers. They say these applications require development time as well as "restructuring time" to enable professors to integrate the computer into their course curricula.

Furthermore, the advanced Andrew workstation and user interface had been targeted to cost $3,000. The real cost is about $5,000. "We missed because the design requirements of the software pushed the cost up," says Walter Schymik, IBM's manager of Carnegie-Mellon studies. "At the present time, students still can't afford it."

Wiring the campus to accommodate existing networks has also yielded unexpected costs, according to William Y. Arms, vice-president of academic services in charge of computing libraries. "We've spent about $500,000 in capital funds on bridges, routers and interfaces," Arms says. "It has been like building a superhighway through an existing city. You can't just drive through the middle — you need detours connecting existing road systems with new road systems."

For applications developers and users of the Andrew system, the rewards have far outweighed liabilities. Writing students, for example, have been able to take advantage of several Andrew tools to improve their work, according to Christine Neuwirth, an assistant professor in the English department who designed some of the department's tools.

Faster feedback

The increased level of interaction between students and instructors is exciting for everybody, Neuwirth says. "Students can send compositions in process to their instructors. They don't need to wait for office hours or class [to get feedback]. Students, in turn, can comment on each other's work. There's a dialoguing capability; if you get a comment and don't understand it, you can write back an electronic note saying, 'Hey, I'm puzzled about this.' "

David Miller, a history professor, used Andrew to create the Great American History Machine, a cartographic application that provides a map interface to U.S. census data taken since 1847.

Miller says that he was originally attracted to the capabilities of the Andrew workstation. "Our program required the use of workstations as powerful as [those from] Sun or IBM RTs; it was the workstation concept that was uppermost in my mind when I came up with the program idea," he says. "But the networking capabilities and the file server turned out to be extremely important."•

Computerworld
PERSPECTIVES
1989

The Annual
Executive Conference
for Strategic
Information Management

June 20–21, 1989 Marriott Marquis
New York City

Computerworld PERSPECTIVES 1989 is the only senior-level conference in the industry dealing with your most important business challenge: How to use information systems to maximize competitive advantage.

Computerworld PERSPECTIVES 1989 is designed exclusively for senior corporate MIS users.

Working with peers and experts in your field, **Computerworld PERSPECTIVES 1989** is a unique opportunity to examine your most pressing IS problems.

In 18 breakout sessions and six workgroup seminars, you will interact with world-class keynoters and speakers.

Computerworld PERSPECTIVES 1989 offers a customized program designed to best meet your needs. You can pursue a single theme or mix and match sessions based on your interests. The three conference themes are:

- *Buying Smart: Pacing Your Information Systems Portfolio*
- *Winning Strategies: Information Systems and the New Corporation*
- *Mandates for Change: Information Systems in the 1990s*

Computerworld PERSPECTIVES 1989 is an intensive two-day conference probing the strategic options, advantages and risks involved in successfully building your information-based organization. You must register no later than March 14. For more information, just attach your business card to the coupon below, or call (212)246-0984.

If you can only go to one conference this year, attend Computerworld PERSPECTIVES 1989.

Computerworld
PERSPECTIVES
1989

YES, I want to learn more about **Computerworld PERSPECTIVES 1989** before March 10. I've attached my business card.

Mail to:

Computerworld PERSPECTIVES 1989
c/o Carter Communications
211 West 56th Street, Suite 31-A
New York, New York 10019

Or call (212)246-0984 and ask to speak with Carter Prescott.

Navy trains its sights on fiber-optic speed, capacity and reliability

Shipboard LAN Safenet charts course for 20 years

BY JIM LEEKE

Stand a 500-foot combat ship on end, says Arthur G. Justice, and what you have is a 50-story building complete with all of the concerns about data transmission, reliability and security that can be found in the MIS department of any Fortune 500 office tower.

That is why Justice, a senior engineer at the U.S. Naval Ocean Systems Center (NOSC), thinks business and industry will be interested in the Survivable Adaptable Fiber-Optic Embedded Network (Safenet), a shipboard local-area network system that the Navy is developing to meet its communications needs over the next two decades.

Safenet is scheduled for a shipboard test by the Navy or Coast Guard early this year, possibly aboard one of the Navy's 1,000-foot-long aircraft carriers. Development of the system began four years ago as a project to simplify the Navy's expensive and largely incompatible tangle of shipboard networks.

SNAPSHOT

Challenge: Replace unwieldy and incompatible shipboard networks with a single, survivable system to meet needs for 20 years.

Response: Install a fiber-optic shipboard LAN based on the IEEE FDDI standard.

One priority for the committee appointed to the Safenet project was to preserve the Navy's existing computer base. "Navy commanders don't want to hear that they have to change all their computer programs," says committee member Richard Bailley, a senior systems engineer at San Diego-based Navy contractor Vitro Corp.

However, the committee felt no hesitation about ripping out more than 100 of the Navy's existing networks — most of them, except for a few Ethernet LANs, proprietary or built for a specific purpose, Bailley says. A major function of Safenet is to replace these disparate systems, plus a massive spaghetti-like tangle of cabling, with a less cumbersome, standardized network.

Leeke is a free-lance writer based in San Francisco.

The Navy considers Safenet's most vital element to be survivability — the ability to keep providing real-time data to vital combat systems during battle.

Another top priority is that the system addresses the Navy's expanding bandwidth needs for the next 20 years, according to Richard Steinberger, manager for digital design at Martin Marietta Aero and Naval Systems in Baltimore. "The general conclusion was, if you give someone bandwidth, they'll find some way to use it. Updating technology means taking ships apart, so this network will have to last 20 years." In addition, the Navy is going from centralized to distributed processing; "That really takes up bandwidth," Steinberger says.

Once the goals were set, the committee had to work out a strategy for meeting them. "After looking at about 120 commercial networking products, we concluded that whatever we lined up had to be public domain, not proprietary where you had to go back to the vendor to get it fixed," Bailley notes.

The committee settled on the IEEE 802.5 token-ring standard, because unlike the 802.3 Ethernet standard, it is deterministic, making it possible to guarantee that each message gets through within a certain amount of time.

The fail-safe element of Safenet comes from a dual-channel, counter-rotating, token-ring configuration — a design adapted from the single-ring 802.5 standard.

"We're taking IEEE protocols and making them survivable in hazardous environments," Bailley says. Only one ring operates at a time, but if that primary ring is cut or damaged, the secondary ring takes over. Tactical networks, such as those directing weapons systems, will be connected to both Safenet rings. Less vital networks, such as those used for administrative or personnel functions, could be connected to just one ring. Even if a ship is attacked, the Navy says it believes Safenet will keep working.

JAMES ARONOVSKY/PICTURE GROUP

Navy's Justice *believes Safenet will appeal to business*

The committee chose the ANSI Fiber Distributed Data Interface (FDDI) standard, which uses fiber-optic cabling. It did so for several reasons.

First, the standard is based on the 802.5 protocols. Second, it supports 100M bit/sec. bandwidth, which gives Safenet plenty of room to grow as Naval transmission requirements increase. Third, fiber-optic cable is less easily tapped and less vulnerable to electrical interference and other outside hazards than is other media.

A fourth advantage of fiber is that it enables the Navy to reduce the complex tangle of coaxial cable and mechanical switches on board to one cabling system.

"There are 50 to 100 tons of cable on some of these ships," Justice says. Bailley, a retired naval officer, estimates that as much as 70% of that could be eliminated via Safenet. Such an enormous savings in weight and volume is enough to affect performance at sea, especially aboard a relatively small ship such as a destroyer.

The network will be implemented in two phases. Safenet I, based on 802.5, is a 16M bit/sec. network that can support 128 nodes at a distance of 300 meters. Safenet II, slated for testing aboard ships late this year or in 1990, will be based on FDDI. It reportedly will be capable of supporting 512 nodes over 2,000 meters.

Although Safenet is a military project — designed with combat systems in mind, and with some individual applications classified as secret — the network itself is what Justice calls a public-domain technology. "We are working with [other] committees to develop standards that will work both commercially and militarily," he says. "We've got just excellent support from the commercial world." Approximately 250 people from some 40 organizations — both military and business — are participating in the development.

Commercial potential

Bailley says he believes Safenet will be easily adaptable to commercial applications because it has only "very, very minor differences" from 802.5 and FDDI standards.

The Navy plans to implement Safenet gradually. New ships will likely be fitted with the network as they are built, according to Justice. Older ships generally will be retrofitted with Safenet as they are ordered into shipyards for regular overhauls.

Safenet II actually has more capabilities than the Navy needs right now. "We are trying to build a five-lane freeway out in the middle of the desert," Justice says. "Even though nobody is using it today, eventually they will be. And there will be both Model Ts and Corvettes — they can share it." •

Computerworld Senior Editor Elisabeth Horwitt contributed to this article.

WHEN YOUR PEOPLE HAVE SO MANY DIFFERENT COMPUTERS TO CHOOSE FROM, WHERE DO YOU DRAW THE LINE?

© 1988 3Com Corporation. All trade names referenced are the service mark, trademark, or registered trademark of the respective manufacturers. 3Com is a registered trademark of 3Com Corporation.

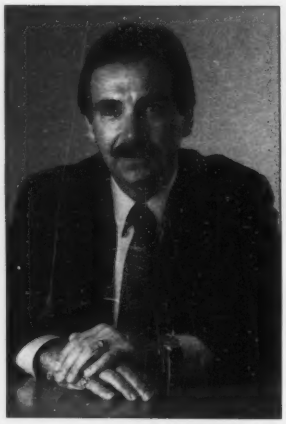
Levi Strauss strengthens customer ties with electronic data interchange

Levi-Link network carries order and shipment information

BY BARBARA SEHR

Mervyn's department stores use the latest in electronic scanners and point-of-sale terminals to track which clothing items are walking out the door and which are staying put on the shelves. But until recently, the Hayward, Calif.-based retail chain had no way to respond to this information quickly enough to change orders to vendors.

Then Levi Strauss & Co., one of Mervyn's key vendors, offered to tie the department store chain into Levi-Link, an electronic data interchange (EDI) network that carries order and shipment information between the clothing manufacturer and its retailers.



"We never looked closely at what it costs to do business this way vs. the old-fashioned way," says Kathryn B. Spangenberg, director of systems and programming at Mervyn's. "We looked upon it as a strategic move."

This strategic move means that Mervyn's no longer has to order 1,000 pairs of jeans several months in advance and pray that customer tastes within an area do not change. Orders are filled in terms of weeks, not months, and fashion trends can be more closely monitored. "We've cut our lead time 50% to 75%," Spangenberg notes.

Levi Strauss was initially drawn to EDI as a way to speed its own order-processing cycle after it had failed to come up with a way to speed deliveries. EDI defines standardized formats for business documents such as orders, shipment notices and invoices that are frequently exchanged between business partners such as manufacturers and retailers.

In 1984, when Levi Strauss first considered EDI, it found no available standard means of electronic interchange. What it did find was a customer list of 17,000 retailers, each doing business its own way. Each had its own system of marking goods: Some had their own bar codes, while others used universal product code (UPC) symbols and still others used no discernible codes at all. Purchase orders and sales reports were put together in a variety of data formats.

Levi Strauss responded to this situation by launching an 18-month effort to reach a common denominator for document formats. Led by Paul Benchener, director of EDI services, company officials visited retail locations all over the country. They held meetings and seminars to get input from their customers.

A major obstacle to retailer acceptance was and continues to be senior management, Benchener says. Some senior managers are either not aware of the value of the electronic link or are not motivated enough to drive the process forward. However, he expects this resistance to diminish as the value of Levi-Link becomes evident.

Levi removed a major stumbling block of its own in 1985 by revising the way it marks products. For the first time in the retail industry, a major vendor attached both its own UPC and the National Retail Merchants Association universal vendor marking to its merchandise. This move avoided the need for retailers to separately mark items as they arrived.

Meanwhile, the Voluntary Interindustry Communications Standards committee, made up of vendors and retailers such as K Mart Corp., Sears, Roebuck and Co. and J. C. Penney Co. as well as Mervyn's, began meeting in 1986 to address a failure to communicate among retailers and vendors.

Many of the large retailers had established proprietary product-marking systems for themselves and their biggest vendors. Levi Strauss, for example, was forced to adopt different markings for jeans sold to Sears, Mervyn's, Wal-Mart Stores, Inc. and others. The meetings and the retailers' quick adoption of the standards that they established paved the way for Levi-Link's acceptance. Most of the major retailers had their proprietary systems adjusted within a year of the arrival of Levi-Link in September 1986.

> A major obstacle to retailer acceptance was and continues to be senior management.
>
> PAUL BENCHENER
> LEVI STRAUSS

Levi-Link uses the American National Standards Institute's X.12 protocol, an EDI standard used by a variety of industries. Purchase orders and other data from retailers are translated to the standard by local Levi-Link software or through the third-party network that links retailers with Levi Strauss. The orders use the universal vendor marking format.

In most cases, the third-party network is provided by General Electric Information Services, which had already supplied Levi Strauss with an EDI service for its own vendors.

Levi Strauss pays for messages it sends to its retailers; the retailers in turn pay for their end of the service.

Despite its huge investment in Levi-Link, which at one point included a 25-member development team, Levi Strauss does not charge retailers for linking into the service. A third-party software house offers the PC-based package to smaller retailers that want to access Levi-Link. Lex Computer in San Mateo, Calif., sells a turnkey system, based on an IBM Personal Computer AT compatible, which includes the Levi-Link connection within an inventory control/financial analysis reporting system.

Only about 25% of all Levi Strauss purchase orders are now submitted electronically. But the company has already profited from increased sales, according to Benchener.

Levi-Link has been expanded beyond the electronic purchase order service. Additional modules allow retailers to improve inventory control, reduce handling requirements and improve stock management.

Officials at Mervyn's are looking forward to a module dubbed Sell Through Analysis and Reporting System, or STARS, which will let Levi Strauss gather data from Mervyn's outlets and predict which colors, sizes and styles sell best at a particular store.

For the retailer that has been keeping an eye on its own bottom line instead of the bottom line of its customers, it may mean improved merchandising and less markdown merchandise. For Levi Strauss, it will mean better prediction of fashion trends. •

SNAPSHOT

Challenge: Speed up processing of retailers' orders, allowing them to respond quickly to changing consumer tastes.

Response: Implement an EDI network that carries order and shipment data between Levi Strauss and retailers.

Sehr is a free-lance writer based in Hayward, Calif.

ANYWHERE YOU WANT.

At 3Com, we network more types of systems to more types of systems than anyone else.

At last count, that amounted to over 350 different mainframes and minis. And over 400 different PCs, terminals and workstations.

Any or all of which we can combine into a single, integrated network. That's because we make more modular networking products than anyone else.

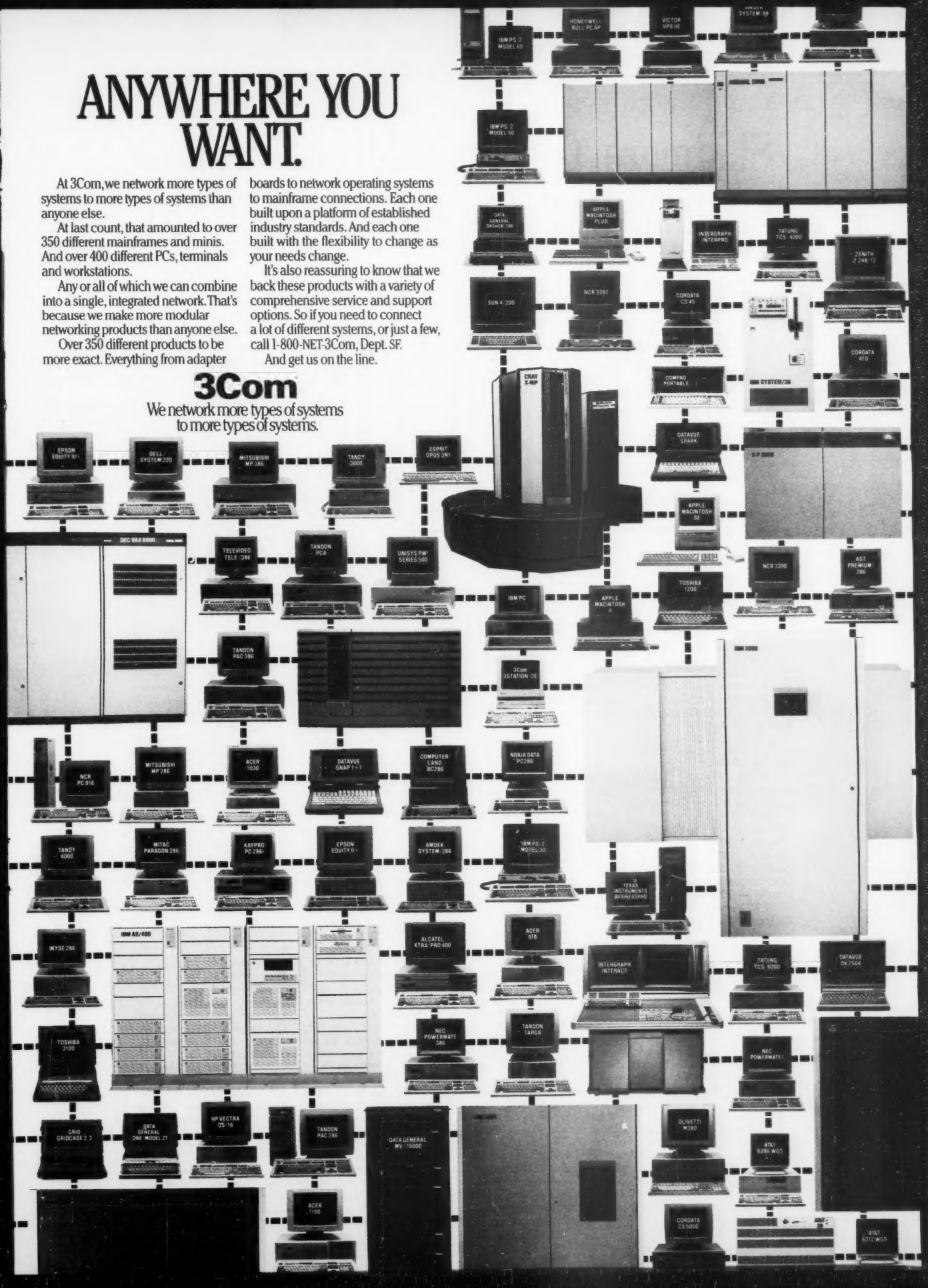
Over 350 different products to be more exact. Everything from adapter boards to network operating systems to mainframe connections. Each one built upon a platform of established industry standards. And each one built with the flexibility to change as your needs change.

It's also reassuring to know that we back these products with a variety of comprehensive service and support options. So if you need to connect a lot of different systems, or just a few, call 1-800-NET-3Com, Dept. SF.

And get us on the line.

3Com

We network more types of systems to more types of systems.



Skidmore, Owings & Merrill designs modular CAD system with PC LANs

BY JEAN S. BOZMAN

Skidmore, Owings & Merrill is known for designing high-tech skyscrapers, including Chicago's Sears Tower, the world's tallest building. But until recently, Skidmore's high-flying work was done by architects and designers working alone at their engineering workstations.

That solitary approach changed about three years ago, when Skidmore obtained a number of IBM RTs under an early-release program. The architectural firm soon began to accumulate dozens of the machines, most of which were dedicated to single-person use. The only drawback to their operation, architects say, was the amount of available air-conditioning. That's because RTs, especially some of the earlier models, generate a lot of heat. "It's like lots of people sitting around running hair dryers," one Skidmore manager says.

The firm's intensive graphical applications use up much of an RT's capacity, so the architects still toil alone. But their 5-million-instruction-per-second RTs are now able to share data files through several networking schemes. "In a sense, we have a mainframe," says Skidmore partner Douglas F. Stoker. "It's just that the horsepower is not just in one box."

This "virtual mainframe" is strung along several industry-standard networking schemes, including Ethernet, the IBM Token-Ring and an older IBM product, the PC LAN. Ethernet was chosen to link 60 RTs in Chicago because it offered distributed services, such as electronic mail and remote file server support, before Token-Ring did.

This year, a Token-Ring began supporting similar distributed services for 80 more Skidmore RTs, which allows users to ask for a file on the same local-area network without knowing where the file resides, according to Michael del Medico, the company's data processing manager.

Files can be exchanged between a Token-Ring and an Ethernet LAN "as long as you know where you're sending your file and where the file [currently] is," del Medico says. Users without that knowledge can check remote RTs' directories until they locate the correct system.

The firm has an Ethernet LAN on an upper floor of a downtown office building and several Token-Ring LANs on lower floors — linked by yards and yards of vertical fiber-optic cable.

With the successful networking of RTs, ad hoc work groups became possible at Skidmore. Project managers can divide up the job of designing a building into manageable pieces, and individual RTs can then pick up their slice of the job.

"We can cluster the RTs for different projects," Stoker says. "At any time, the firm is planning about 100 different buildings worldwide. Any one architect might be working on several jobs at once." Once their portion of a job is completed, each work group can merge the segments and send them electronically to a centralized printing facility.

One project might be for a space that includes one million square feet, another for 200,000 square feet. "The network allows us to do multiple activities without people getting in each others' way," Stoker says.

Architects working on the same job can exchange information and even complex drawings over the network. It takes only 35 seconds to send a 142M-byte file, including graphics, one manager reports. A user on an Ethernet can request a file that resides on a Token-Ring LAN.

"We're talking about distributed network processing power in which you truly don't know which network your job is running on," Stoker says. "We can break up the building's image into a series of 'tiles,' and then each [RT] machine can work independently on its part of the job."

Because each task is "sized" to the appropriate number of processor engines, the need for a central host is greatly diminished, Stoker says.

The distributed computing system will eventually replace the shop's aging Tektronix, Inc. and IBM 5081 workstations — as well as its Digital Equipment Corp. VAX computers. The company has already dispensed with seven of its original 12 VAXs. In the end, the only host machine will be an IBM Application System/400 that is supposed to replace a System/38.

Skidmore had to ramp up to get its RT project going. An initial task force of 100 people designed the software that runs on the reduced instruction set computing-based RT, Stoker says. Now, a smaller group of 45 maintains and enhances the software.

Skidmore has, in association with IBM, developed a software program that will allow other firms to create architectural drawings on the RT. One advantage of becoming an IBM developer was that Skidmore did not have to pay for many of its RTs.

IBM is just beginning to market the architectural software suite. But Stoker claims his firm will retain its competitive edge, which it derives more from how it uses the software than from the package itself.

> Architects working on the same job can exchange information and complex drawings over the network.

Skidmore's data processing operations staff is small. Four people maintain the hardware and peripheral equipment. There is no formal DP organization and only one small-scale computer room.

The primary advantage of Skidmore's networking scheme, Stoker says, lies in its flexibility. Purchasing hardware systems represents a commitment to overhead that often is not justified by a firm's daily work load.

"You can't slice a VAX up and send half to another office," Stoker observes. "This way, if a really big project shows up, we can always go out and buy more RTs." •

SNAPSHOT

Challenge: Overcome lack of flexibility and high overhead of host-based CAD system and the staff needed to support it.

Response: Create a network of RTs linked by Ethernet and Token-Ring, with nets linked by fiber-optic cable.

RALPH HEFTOFT/PICTURE GROUP

Skidmore's Stoker *explains building design with RTs*

Bozman is *Computerworld's* West Coast bureau chief.

Fidelity bypass network gives control over firm's communications destiny

Partnership to offer reliable voice and data communications

BY ALAN RADDING

If Fidelity Investments still harbored any qualms about becoming its own telephone company, they were erased by the fire last May that knocked out an Illinois Bell transmission station and isolated local business for a week. A fire like that would devastate Fidelity, a financial services company that relies on the local telephone system to handle millions of dollars of transactions every day.

Fidelity has implemented elaborate backup systems for its computers as well as alternative long-distance telephone services. But, like most companies, the firm depends on the local telephone company for voice and data communications between local sites and for connections to the long-distance networks.

As a result, says George Hertz, president of the Fidelity Communications division, the company became a partner in Teleport Communications-Boston (TCB), a joint venture of Fidelity Communications, created to act as managing partner in the venture, and New York-based Merrill Lynch Teleport Technologies Inc. (MLTT), a subsidiary of Merrill Lynch & Co.

MARTHA EVERSON

TCB's Chisholm *advises an all-fiber backup system for peace of mind*

Fidelity's primary goal was to create a fiber-optic bypass network in the Boston area that would provide redundancy in its voice and data communications systems. The network also has the potential to reduce Fidelity's local telephone bills and, through the sale of excess bandwidth to other companies, eventually become a profit center in itself. But these were secondary considerations, according to Hertz.

The company could have waited for Merrill Lynch or someone else to establish a network and signed on as a customer, but that isn't like Fidelity, Hertz says: "We are very aggressive when it comes to technology. We wanted to be involved in getting it off the ground. If [an alternative network] already existed, then it would be a different issue."

Participation by other large companies as customers is crucial to the venture. Creating the network "was too expensive to do on our own," notes Hertz. "We were willing to invest if necessary," he continues, but the way to overcome high cost was to sell unused network bandwidth to other businesses.

The fiber-optic cable has enough capacity to support a number of customers, and TCB plans to attract business by touting the higher reliability of an all-digital, fiber-optic network over traditional telephone lines that use twisted-pair wiring. The service will be priced competitively with offerings from New England Telephone, a Bell operating company, according to Paul Chisholm, TCB vice-president and general manager.

The reduced costs for use of the TCB network will also appeal to users, but "there is no intent to be a low-cost provider," Chisholm says. Instead, he plans to price TCB competitive with or just slightly lower than the carrier, but to provide better quality for the money. "New England Telephone gives a single pair of wires. We'll give all-fiber and go directly to the floor, not just to the building," he points out.

Anticipating demand for more reliable, high-volume communications among regional businesses, New England Telephone last spring initiated service on a fiber-optic network linking more than 130 buildings in downtown Boston.

Another competitor, a 1987 start-up venture called Teleport Boston Corp., plans to link city businesses locally and west to Route 128, an area crowded with high-tech companies. In addition, Teleport Boston plans to provide its customers with a satellite-based link to other countries and areas of the U.S.

The implementation of a metropolitanwide fiber-optic network is not a small undertaking, particularly in a major city like Boston. After formally announcing the project in February, TCB spent six months negotiating with the city of Boston about digging up streets to lay cable. Under the city's new policy on street cuts, explains Chisholm, companies digging up the streets must coordinate their efforts to minimize disruption.

Fidelity will not use the TCB network simply as a backup to be kept in reserve, but, with other customers, it will use it daily on a load-sharing basis.

To guard against failures, TCB will maintain redundant fiber cable and redundant electronics. A central operations center will offer round-the-clock monitoring, diagnostics and troubleshooting.

TCB will offer a standard digital interface, 1.5M bit/sec., or 45M bit/sec., a high-capacity option. Multiplexers are used to interface conventional digital telephone lines with the all-fiber, all-digital network.

TCB set up the operations center in September and began laying cable in October. The network went on-line this month.

The first phase, connecting the operations center with nearby Fidelity facilities, was completed in December. Commercial service for one section of the financial district will begin in February, with other Boston areas scheduled to go on-line gradually during the year. Customers are already lined up to go on-line as soon as the service starts, Chisholm says.

Construction will follow a two-pronged strategy. TCB will concentrate on linking with the carriers and simultaneously begin hooking up customers such as Fidelity.

Marketing will not begin in earnest until the system is operational. "We've been working on generic awareness while we are waiting for a product," Chisholm says.

The Illinois fire gave the project's visibility a dramatic boost by heightening awareness of the vulnerability of companies that rely solely on the local telephone system. Following news of the fire, TCB experienced an increase in inquiries from prospective users.

From a financial standpoint, it will take several years for Fidelity's investment in TCB to pay off, Hertz says. From an operational standpoint, however, Fidelity expects to receive dividends in the form of better quality telecommunications and peace of mind from the first day of operation. In the event of a disaster, its investment in TCB may prove to be invaluable. •

SNAPSHOT

Challenge: Avoid dependence on local operating company for reliable local networking and long-distance connections.

Response: Form Teleport Communications-Boston, a partnership to develop a fiber-optic bypass network and resell bandwidth.

Radding is a Boston-based author specializing in business and technology.

WE'RE OPEN TO ANYTHING.

INTRODUCING 3+OPEN™ LAN MANAGER.

At 3Com, we've developed the first completely open, non-proprietary network operating system.

And the only standards-based, high performance network operating system to ensure connectivity between today's DOS, Macintosh®, UNIX® and IBM® host systems. While supporting the OS/2 LAN Manager distributed applications to come.

Only 3+Open LAN Manager is based on widely accepted file and network protocol standards supported by Microsoft, IBM, Digital Equipment, Hewlett-Packard and others. To provide a wide range of multi-vendor connectivity.

In other words, 3+Open is remarkably flexible.

It's also incredibly functional. With advanced mini-computerlike capabilities in security and network management. And standard application programming interfaces which allow you to tailor 3+Open to meet your specific needs.

All of which means that 3Com can now network more types of systems to more types of systems than ever before. To learn more, all you have to do is call 1-800-NET-3Com, Dept. SF.

And keep an open mind.

3Com

We network more types of systems to more types of systems.

© 1988 3Com Corporation. 3Com and 3+Open are trademarks of 3Com Corporation. Apple, the Apple logo, and Macintosh are registered trademarks of Apple Computer, Inc. IBM, the IBM logo and Operating System/2 are trademarks of International Business Machines Corporation. UNIX is a registered trademark of AT&T Information Services. MS-DOS is a trademark of Microsoft Corporation. Digital Equipment Corporation and VMS are trademarks of Digital Equipment Corporation. Hewlett-Packard is a registered trademark of Hewlett-Packard.

Alexandria trusts in regional Bell operating company's CO-LAN service

BY THOMAS NOLLE

When the city of Alexandria chose a central office local-area network (CO-LAN) service for its data communications needs in 1986, it was, in a sense, taking a double chance. First, the Virginia city was gambling that its data transmission needs would not outgrow the CO-LAN's top speed of 56K bit/sec. Secondly, it was assuming that a local switched network could adequately support IBM Systems Network Architecture communications — which was by no means a given.

So far, the gamble seems to have paid off. The city now has an inexpensive way to provide terminal-to-host access for all of its workers.

The decision to implement Bell Atlantic Corp.'s central office-based communications services came out of the city's need for a way to coordinate a voice/data network that was getting out of control. "Every day there are a lot more desks with PCs or terminals, and new and old users want to communicate," says Gary Post, the city's deputy director of data processing.

Alexandria is an IBM shop, running 4381 and 4341 mainframes. The network supports 400 devices in 41 locations, with hundreds of personal computers and casually linked users. Coaxial cabling between PCs or terminals and controllers was becoming a problem as the number of PC users grew, and so was the cost of terminal emulator boards.

A second concern was the growing traffic between PCs, which tended to pass through the mainframe as an intermediary because there were no direct PC-to-PC links. The city uses IBM's Professional Office System (Profs) electronic mail system. PC users who wanted to transfer files would drop them in the mainframe and notify the receiver via Profs. This indirect communications made the mainframe the relay point in activities it had no particular involvement with and doubled the transmission load by requiring that everything be sent and received twice.

A third concern was the growing cost of connecting different sites — particularly small sites with just one or two workstations — with leased lines and controllers. The city had a policy against the use of dial-up service stemming from security concerns.

Like many users, Alexandria did not want to make a large capital investment in equipment and relied instead on Centrex, the central office private branch exchange alternative. "PBXs were too expensive, and we were concerned about the ongoing cost of operational support for them," Post explains.

The city's needs were indirectly served by a fire in the main telephone switching office at Alexandria, a facility owned by Chesapeake and Potomac Telephone Co. of Virginia, a Bell Atlantic Corp. company. It resulted in significant water damage, and the central office switching equipment was replaced. One of the facilities added was Datakit, a product from AT&T Network Systems that, when used in conjunction with voice/data multiplexers, allows a telephone company to offer fast-packet data and voice over the same circuit. As a result, C&P started offering CO-LAN services, which make a Centrex system into a telephone switch with almost LAN-like data connectivity.

Alexandria's first guinea pig was IBM's Profs, a group of host-based office automation applications, including E-mail, that was generating the largest number of new users.

Since that initial test, users have added a diversity of applications to the network. The print shop has installed a CO-LAN link through which PC users can dump files for typesetting. The new technology is also used as a backup for the computer-aided dispatch of emergency services.

But the major application of the system is in the processing of police bookings and scheduling of court cases. Much of this traffic is concentrated in the morning, when courtrooms are being assigned, and late at night. "A lot of businesses have their communications peak when the stock market closes. We have ours when the bars close," Post jokes. Even during these peak periods, performance and availability have met expectations.

The new system has given many remote users access to mainframe data for the first time, says Linda Dell, a supervisory computer equipment specialist who has been showing PC users how to communicate over the network. But this new capability required "learning a little bit more about how their PCs worked," she adds.

To access or transfer a file, the remote user had to know what was in files, where they were and how to manipulate them. "The separation of applications and communications has helped [users] learn DOS commands and stopped them from using application-specific, inefficient file transfer procedures," Dell says.

The biggest benefit the new network brings users is in the file transfer area, Dell says. "It's faster and lets you call other users." Where before the mainframe was used as a drop point for remote users, in which one person would leave off a Profs message and someone else would pick it up, users now can connect directly, eliminating the mainframe middleman and permitting communication when the mainframe is unavailable, Dell says.

There have been applications that have proved unsuited to CO-LAN. For example, the city has not used the network for transactions similar to point-of-sale transmissions because the asynchronous connection between CO-LAN end points is not error-protected in itself, and many asynchronous emulation environments do not provide add-on error correction. As a result, a message being sent to the host might disappear without the user's knowledge, Post says.

So far, however, the network has saved the city money on coaxial cabling, controllers, Irma boards and other equipment. And CO-LAN has been a winner at serving users' needs, Post says. Alexandria is now moving toward full commitment. ●

MANUELLO PAGANELLI

"PBXS WERE too expensive, and we were concerned about the ongoing cost of operational support for them."

GARY POST
CITY OF ALEXANDRIA

SNAPSHOT

Challenge: Off-load E-mail and file transfer from the mainframe and provide low-cost voice and SNA communications.

Response: Choose a central office-based LAN service that gives a Centrex system LAN-like connectivity.

Nolle is president of CIMI Corp., a communications consulting company based in Haddonfield, N.J.

M. W. Kellogg MIS department learns to support LANs the hard way

BY IRA DEMBER

When M. W. Kellogg Co. converted from a centralized mainframe to a distributed networking system, MIS managers had to learn the ins and outs of network support the hard way — by doing. "Maybe we bit off more than we could chew at first," says Marc Malacoff, an MIS manager turned network manager. "No one in the company, including me, had any local-area network experience. We didn't even really know what a LAN was."

Kellogg, a Houston-based subsidiary of Dresser Industries, Inc., designs and builds refineries and chemical plants worldwide.

During the last five years, the company shed its IBM mainframe orientation in favor of a three-tier approach embracing mainframes, minicomputers and personal computers. As a result, Kellogg's MIS people have been supporting more than 1,000 computer users who communicate with one another and with computer resources throughout the company via local- and wide-area networks and micro-to-mainframe links.

The MIS team's first job was to implement the right technology to provide these connections. It selected an Ethernet backbone LAN from Bridge Communications, Inc., now part of 3Com Corp. The team placed a server on each of the building's 21 floors.

The installation did what it was supposed to do, but maintenance became a nightmare. In order to update protocol- and port-specific information, Malacoff recalls, "I'd be running up and down stairwells on Sundays to update the servers with floppies." The job is now simplified by using two of Bridge's Compaq Computer Corp. Deskpro 286-based Network Control Servers, which update all servers simultaneously.

Dember is a free-lance writer based in Houston.

SNAPSHOT

Challenge: Maintain a new LAN environment and support its 1,500 users.

Response: Select network maintenance products and consultants; develop flexible, transparent, menu-driven OS interface, Help desk, manual, guidelines.

Networking newcomers win with structured, flexible approach

Then there was the question of how to provide users with easy access to the resources they needed. Two MIS groups vied for control of the network turf. The Systems Programming department wanted to give users direct access to the operating system. Technical Support took an opposing view, favoring a transparent menu-driven interface. The latter group won.

But, says Michael V. Key, manager of computer technology, "We imposed the discipline of an IBM production environment onto the VAX environment: controlled libraries, controlled programs — a structured mainframe approach, somewhat modified."

Aside from protecting data integrity, says information center manager David L. Lee, "structure makes it easier for us to help users. A user calls and says, 'Help, I'm lost.' Without a structured environment, you sit there on the phone, scratching your head, wondering where to begin. But with structure, you can immediately figure out what directory he's in and where he needs to go. You can save hours of fumbling around."

The MIS team developed an elaborate, evolving system of nested menus that take users wherever they want to go within the Digital Equipment Corp. VAX VMS environment. Numerical shortcuts penetrate multiple menu layers for those who know their way around.

When new users come online, MIS customizes a menu environment to meet their specific needs. "We let even novices have a big say in how their menus are set up, so they are participating in their own MIS support," Key says. "Later, when their requirements change and we modify their menus, they help us understand what menu changes will make the most sense. That's when user participation really pays off."

User support begins on a new employee's first day. The new person gets a six-page overview describing Kellogg's computing resources, classes and Help facilities. The company's information center operates a Help desk staffed by three people. "We handle 150 to 200 calls a day," Lee says. "About 20% of them are network-related."

Barbara L. Thompson, a Kellogg secretary, says she typically calls the Help desk once a week — "usually when the system is running slow, or when I send a file to the [departmental] printer and it gets stuck somewhere in the print queue."

End users receive a hefty, five-pound loose-leaf guide to Kellogg computer systems. It has a section on networking and communications, including information on how to access the LAN from a PC at home, something that hundreds of employees now do at one time or another, Lee says.

Early on, Kellogg's MIS people learned that vendor promises can affect LAN user support. One vendor promised IBM Systems Network Architecture gateway software that would run on the network. "It ran, all right," Key says. "But we had to work with them intensively for 12 months before it was fully stable."

During the shakedown period, mainframe users accustomed to a 132-column by 27-line display fumed that with the gateway, they could only get the standard 80 columns by 24 lines — a flaw the vendor later corrected.

In the mainframe days, Kellogg had more than 500 computer users — most of them in engineering — and some 300 people in MIS providing maintenance and support. Today, Key notes, 60 MIS people provide maintenance and support for more than 1,500 users ranging from expert to novice.

Network analysis has become more sophisticated, too. "A couple of years ago," Malacoff says with a smile, "we'd measure off LAN capacity by using soda straws to hold down the auto-repeat keys on 10 terminals connected to a single server, until the LAN overloaded."

Malacoff now uses a Network Communications Corp. protocol analyzer, a Tektronix, Inc. 1502 time-domain reflectometer and Network General Corp. Sniffer to analyze network problems. He calls in a consulting team to give the LAN a checkup annually or whenever he makes a substantial modification, such as adding repeaters or fiber-optic links or replacing part of the Ethernet backbone.

Kellogg has new support challenges looming on the horizon, Key says. "We've started connecting with clients' systems and networks, and soon we'll be [connecting] with vendors." •

Kellogg's *Key, Malacoff and Thompson (left to right) tackle LAN support*

Access and security in delicate balance at Pacific Gas & Electric

Multifaceted approach includes educating users in system security

BY CLARE P. FLEIG

With as many as 6,000 networked personal computers, Pacific Gas & Electric Co. has been dealing with a problem that sooner or later confronts all large networking installations: how to help authorized users access network resources without leaving the door wide open for the unauthorized and unprincipled.

"We wanted to make networks easier to use, but that also makes them easier to get to," says David Langholff, the senior data/voice engineer in charge of building Pacific Gas' security system who has since become a telecommunications planning manager at Mervyn's department stores.

While the San Francisco utility has itself experienced no break-ins, incidents at other companies, including at least one other California utility, have prompted it to develop a complex, multilevel security system to safeguard its mainframes, PCs and network servers as well as the local- and wide-area network systems themselves.

> "THERE ARE a lot of people who would like to have access to our files."
>
> DAVID LANGHOLFF

The security system, built up at Pacific Gas from a combination of vendor products and homegrown programs over more than a decade, tackles the problem of break-ins from a variety of angles. On the physical side, an identification sequence would not only establish the user's right to be on the network but also the right to log on from that particular terminal, controller and port.

Once users have gotten onto the physical network, they must enter a series of individual and group passwords in order to gain access to applications, databases and even individual records on a host or network server.

LAN security proved to be a special headache for Pacific Gas. First of all, it was virtually impossible to implement a consistent security system — or communications system, for that matter — across the utility's heterogeneous installation of several dozen networks from Novell, Inc., Banyan Systems, Inc., Digital Equipment Corp., IBM and Apple Computer, Inc. Pacific Gas is solving this problem by phasing out all networks except the Banyan LANs, Langholff says.

Most LAN vendors do provide some level of security at the file server level, and Banyan's encrypted passwords proved quite effective. However, LAN topologies have built-in security problems that no one has really addressed as yet, Langholff complains.

For example, in the standard Ethernet bus topology, all messages are broadcast over a cable until they reach the right destination. Thus, unauthorized users can scan data packets as they go by without acknowledging that the packets have been read. This problem, which also exists in the token-ring network, will not go away until network schemes are altered, Langholff says.

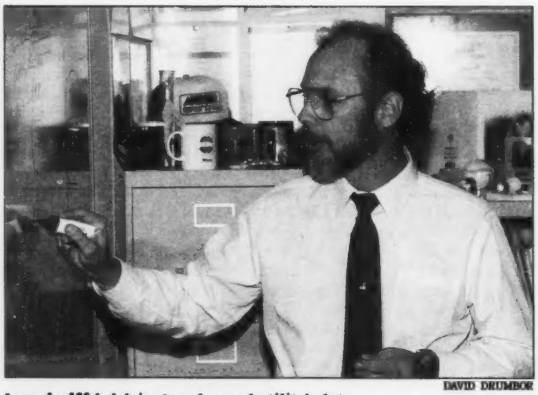
Analyzers such as Network General Corp.'s Sniffer, which Pacific Gas uses to scan the network for problems, represent another potential security leak. Unauthorized users can use such products to scan the LAN for holes in security, Langholff explains. As a result, Pacific Gas imposes stiff penalties on unauthorized users of LAN analyzers, sometimes even firing them.

Pacific Gas' security system needed to extend beyond the on-site world of LANs, however, to its wide-area network, which combines leased lines with Telenet Communications Co.'s packet-switched service.

SNAPSHOT

Challenge: Give users of 6,000 PCs access to resources without compromising security.

Response: Institute multilevel passwords for applications and records, standardized LANs, dial-back procedures, audit trails and training.



DAVID DRUMMOR

Langholff *led drive to safeguard utility's data*

User access from remote sites via public data networks is particularly difficult to monitor and control, so Pacific Gas implemented special security measures on those long-distance links. For example, access to the network from remote ports is guarded by a procedure in which the user enters an ID and hangs up, then the system dials back to ensure that the call is being made from the site associated with that ID number.

As part of the effort to tailor Pacific Gas' security system to its particular security needs, Langholff's group also tried to identify what type of break-in artist is most likely to go after the utility's systems.

"There are two types of thieves," Langholff explains. "The merely curious who want to see what the system can do and the more dangerous ones with intent to do damage."

As a public utility, Pacific Gas is a likely target for the second kind of break-in, Langholff says. "We have the records of every person in California who has ever paid a utility bill," he adds. "There are a lot of people who would like to have access to those files."

Security is so tight on those records that even supervisors with a high security clearance can only get access to numbers in their district.

Pacific Gas has installed software on both IBM mainframes and Banyan servers that maintains an audit trail of users' progress through the network. That way, the utility company can at least determine how a hacker got in and how far he went, Langholff says.

But mechanical systems to foil the purposeful thief can easily be sabotaged accidentally by either ignorant or careless users, Langholff points out. He says he had particular trouble with top managers who found that "getting the PC in their offices and getting it to run is wonderful, but then they have to deal with all of those passwords."

Two-way dilemma

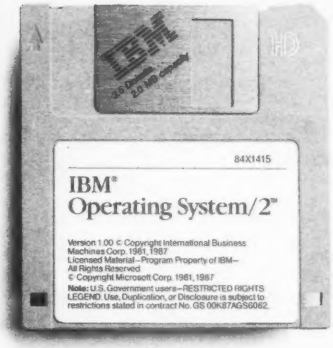
This resistance posed a dilemma: If getting into the system became too difficult, users would be discouraged from using their computers. But techniques that facilitate access for authorized users can also pave the way for potential thieves. For example, it is a common practice at Pacific Gas to create macros that automatically input a string of passwords for the user. Unfortunately, this means that "if you steal someone's computer, you turn it on and are automatically into Pacific Gas," Langholff says.

The company is trying to guard against user carelessness by making its employees responsible for break-ins that occur on their terminals. "It's not like a credit card where you are just responsible for the first $50 a thief charges on your card," Langholff says.

"Right now, anyone at Pacific Gas who is trained in the PC and network is also trained in security," he adds. "Any security system is only as secure as the people who participate in it." •

Fleig is director of systems research specializing in local-area networking and IBM communications at International Technology Group in Los Altos, Calif.

WITH SO MANY DIFFERENT OPERATING SYSTEMS TO CHOOSE FROM, WHERE DO YOU DRAW THE LINE?


IBM
HD
84X1415
IBM®
Operating System/2™
Version 1.00 © Copyright International Business Machines Corp. 1981, 1987
Licensed Material—Program Property of IBM—
All Rights Reserved
© Copyright Microsoft Corp. 1981, 1987
Note: U.S. Government users—RESTRICTED RIGHTS LEGEND. Use, Duplication, or Disclosure is subject to restrictions stated in contract No. GS 00K87AGS6062.

New York cleans up SNA act with backbone linking 12 data centers

BY ROBERT MORAN

New York City is hoping to cut communications costs by $1.5 million per month by bringing its 12 data centers into a centrally managed network. To provide the power, reliability and flexibility it wants in its communications system, the city has become an early user of IBM's Systems Network Architecture (SNA) software releases, which the vendor just started shipping last fall.

Citynet, which links 12 major data centers thoughout New York within a common communications network, will begin service in March and is scheduled for completion by September. It is expected to yield operating savings starting July 1, the beginning of the city's fiscal year.

At present, the city's numerous networks are each managed separately; a mesh of wires running to and from buildings and offices gives users access to the various data centers. "Some desks have two terminals so that users can access critical data from at least two mainframes," says David Passmore, vice-president of Network Strategies, Inc. and a participant in the initial stages of the project.

New York is in the process of rebuilding this complex collection of networks into "something that will be significantly less costly and more effective to run, expand and support in terms of disaster recovery," says Joseph Giannotti, commissioner of the city's computer and data communications services.

The Citynet contract, worth $31.5 million, was awarded to Boeing Computer Services in Vienna, Va., with IBM serving as a subcontractor for the equipment and network software.

The new architecture will consist of an SNA backbone that will manage access between 7,000 user terminals and the 12 data centers. Two switching hubs, linked together by two T1 lines, will be equipped with an IBM 3745 — IBM's most powerful communications processor. The city plans to eventually implement a second, backup processor on each 3745 to increase network reliability, Giannotti says.

As telecommunications controllers, the 3745s are expected to help cut the city's communications costs by as much as 90%. Right now, data centers and user sites are linked via direct, dedicated lines. This is costly because such links frequently extend between different New York Telephone Co. access regions, subjecting them to extra charges by the local carrier.

Citynet will minimize such charges by collecting multiple 9.6K bit/sec. data lines from sites within one region, concentrating them at a wiring center and sending them over a 56K bit/sec. channel to the 3745s at the networking hubs. The communications controllers will then switch the traffic to the appropriate data center.

The use of 3745s as telecommunications controllers is not new, but according to Giannotti it has one drawback compared with the use of T1 switches: IBM communications controllers cannot handle voice. However, he adds, the city had already chosen to leave voice and data separate because the limited number of data centers makes designing a data network "far more straightforward" than the more dispersed voice system.

Another crucial component of Citynet is a centralized network management system, which will reside on an IBM 4381 running VM/XA, VTAM and Netview. The host will control the logging on and off of terminals, monitor network traffic, diagnose faults and bring network components back into service.

New York also plans to take advantage of advanced control, recovery and diagnostic functions that IBM has implemented in the latest versions of VTAM and Network Control Program by gradually upgrading all its data centers and hubs to those versions over the next year.

IBM's newest releases introduced the capability of dynamically updating SNA tables without taking the network down. This capability should "significantly facilitate network changes — and with 30-plus agencies accessing 12 data centers on 7,000 terminals, we are continually changing something somewhere," Giannotti says.

Robert Townsend, MIS director at the city's Financial Information Services Agency, has mixed feelings about the Citynet consolidation project. On the positive side, Townsend says, "The backbone is in place for us to do what we want to do; [it] won't have to be coordinated and fought over."

For example, if an application requires interagency communications, such as remote printing, the network pieces are in place. Townsend adds that a possible future application for the network would be distributed data operations throughout the city.

But he also anticipates losing some of his department's autonomy under the new regime, since all agencies will have to go through Citynet whenever they want to introduce new communications facilities or share applications.

"We are adding steps that from my perspective will make us less efficient," Townsend contends. "Now we must rely on someone else to do their piece and make sure the effort is coordinated." At present, if the agency wants to expand an application to other agencies, it controls the entire implementation — from ordering the telephone lines to buying the hardware.

Giannotti agrees that his group will be taking over several networking responsibilities from the agencies, such as coordinating the implementation of new applications and terminals.

His group will also maintain a database to keep track of the location and use of all circuits in order to check the accuracy of bills, ensure maximum use of lines and anticipate the need to order extra capacity, he adds.

But while Citynet will cost agencies some autonomy, it also is expected to reap big cost savings for New York and boost many agencies' quality of service, Giannotti says: "Right now, some data centers handle [things] more aggressively than others; this way, all will get good service." •

JOHN MARTINI

> "WITH 30-plus agencies accessing 12 data centers on 7,000 terminals, we are continually changing."
>
> JOSEPH GIANNOTTI
> CITY OF NEW YORK

SNAPSHOT

Challenge: Cut costs and ensure consistently high reliability and service for network of 12 data centers.

Response: Replace point-to-point links and autonomous networks with SNA backbone using hubs and concentrators.

Moran is *Computerworld's* Mid-Atlantic News Bureau correspondent.

ANYWHERE YOU WANT.

At 3Com, we can take computers running any or all of the operating systems on this page and combine them into a single, integrated network.

Making incompatibility among operating system software virtually a non-issue.

Be it in workgroup, departmental or enterprise-wide networks.

In fact, we network more types of systems to more types of systems than anyone else.

Because we make more modular networking products than anyone else.

Everything from network operating systems to adapter boards to mainframe connections. Each one built upon a platform of leading industry standards. And each one designed with the flexibility to change as your needs change.

It's also reassuring to know that we offer a variety of comprehensive service and support options.

So take a look at your list of preferred vendors. If 3Com isn't on it, maybe you should call 1-800-NET-3Com, Dept. SF.

After all, you're going to have to draw the line somewhere.

3Com®

We network more types of systems to more types of systems.

Tenneco puts itself on the ISDN line negotiating with local carrier

BY THOMAS NOLLE

Many information systems managers still see Integrated Services Digital Network (ISDN) as something they will probably have to implement eventually, once the industry is more mature. But a few adventurous companies have been willing to act as guinea pigs for the emerging telecommunications standard.

While a number of businesses have been hosting ISDN site trials in the last few years, Tenneco, Inc. was one of the first U.S. businesses to implement a commercial ISDN offering. The holding company recently cut over to an ISDN service from Southwestern Bell Corp., which supports both voice and data communications among its Houston sites.

Among the paybacks that have resulted from ISDN implementation are lower connection costs, increased networking flexibility and the potential for more creative networking applications, such as local-area network-to-LAN bridging, when more ISDN products become available.

As an ISDN pioneer, Tenneco had to break some new ground — negotiating one of the first ISDN contracts with Southwestern Bell, for example, and persuading vendors to implement ISDN interfaces on their existing communications equipment.

The risks Tenneco took should result in major paybacks in cost savings and enhanced voice/data capabilities, says Thomas Simmons, a Tenneco consultant with the project and now manager of worldwide telecommunications at the JICase division in Racine, Wis.

Southwestern Bell's ISDN service defines a Basic Rate Interface connection — two 64K bit/sec. digital lines, plus a separate 16K bit/sec. D channel for signaling and packet-switched data. This resembles the Bell operating company's Centrex offering in that it provides communications only within a group of Tenneco buildings in Houston.

Unlike Centrex, however, the ISDN service also offers high-speed, universal data connectivity in direct digital form. Modems are not used with ISDN except when they are needed to connect to a non-ISDN user.

Instead of using one set of lines for voice and a piecemeal implementation of incompatible networks and modems for data communications, Tenneco now uses one universal backbone of twisted-pair wiring that can carry voice, data and eventually video, Simmons says.

Instead of incurring high costs every time a user is relocated or added to the network — $500 according to a popular industry estimate — Tenneco can make these changes simply by unplugging and plugging in a telephone jack.

ISDN also offers users enhanced voice services, such as the ability to identify a caller before picking up the telephone, and more efficient routing of calls to an available service representative.

Tenneco began to explore ISDN as a way to standardize the fast-growing data communications connections within its Houston building complex. LANs were not the answer, according to John Saccente, a consultant who until recently served as the company's director of corporate telecommunications. There was too much geographic dispersal and too many different sets of connection requirements in terms of interface hardware and cabling, he says.

Tenneco was already using Southwestern Bell's Centrex system for voice communications. The holding company approached the local carrier about an ISDN version of Centrex.

While the 64K bit/sec. ISDN links could carry both voice and data, it was data integration that ultimately sold Tenneco on the technology, Saccente says. "ISDN data connectivity in a Centrex environment made it possible to justify the project through modem elimination. We would not have upgraded [to ISDN] for voice functionality alone," he asserts.

Tenneco wanted to allocate turnkey project responsibility to one vendor to minimize the risk of being an early ISDN user. But divestiture made this move impossible. Southwestern Bell, wearing its local-exchange carrier hat, could provide the Centrex service but not the equipment.

AT&T Network Systems made the ISDN phones and adapters and had the necessary technical expertise but sold its products to carriers such as Southwestern Bell. Southwestern Bell Telecom, an independent equipment subsidiary, offered better pricing in addition to a single point of contact for equipment of all types, but it lacked product experience.

So Tenneco had to protect itself through careful negotiations with all parties. "Centrex lets us off-load network responsibility on the carrier," Saccente says. The contracts dealt with issues such as vendor responsiveness and possible future price decreases in customer-premise equipment.

Negotiations led to an agreement with Southwestern Bell Telecom covering customer premises equipment with a support assist from AT&T Network Systems. A separate service contract covering 10 years was executed with the Southwestern Bell carrier arm to provide stability and accountability for specific ISDN Centrex issues.

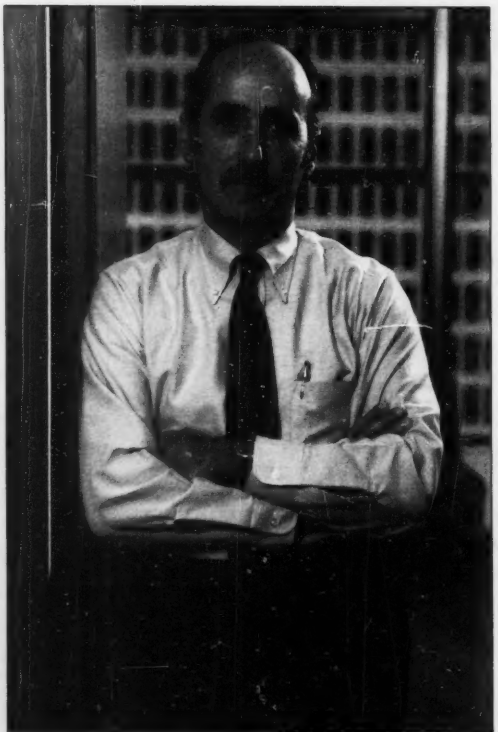
Saccente says he tried to avoid dealing with the fine points of ISDN specifications, some of which have not been finalized by industry standards bodies. Instead, Tenneco's contract was negotiated on the basis of ordinary management issues such as mean time to respond and on-line management systems for moves, adds and changes.

The contract calls for very

SNAPSHOT

Challenge: Standardize and cut cost of voice and data communications between Houston buildings.

Response: Negotiate ISDN contract with regional carrier, implementing digital voice/data connections on twisted-pair wiring.



DAN FORD CONNOLLY/PICTURE GROUP

Saccente *set the pace for ISDN implementation at Tenneco*

Nolle is president of CIMI Corp., a communications consulting company based in Haddonfield, N.J.

specific acceptance criteria. "You cannot take ISDN cutover issues for granted; there's not enough experience in the field," Saccente explains. The contract also provides Tenneco with some protection from the likelihood that pricing for ISDN equipment will fall.

Since ISDN is considered a competitive service, Tenneco was free to negotiate the best deal it could make. Saccente declines to discuss the details, but other industry sources assert that Tenneco's service rates for ISDN Basic Rate Centrex are comparable with those for Centrex alone.

The network Tenneco contracted for consists of ISDN Centrex services linked to AT&T 7506 ISDN station sets that support the ISDN Basic Rate Interface. All intra- and intersite voice and data traffic within Tenneco is routed through the regional carrier's central office ISDN switch. Tenneco originally planned to install 4,300 ISDN lines. The actual number is closer to 2,300, Saccente says, because the now-divested Tenneco Oil Co. was never linked into the network.

From the start, Tenneco knew that some promotion of the concept of ISDN-based desktop communications would be needed. While the personal computer modem users were at least willing to listen to the ISDN alternative, some islands of LAN technology had to be won over.

"We showed Ethernet users the ISDN solution, and they said, 'If we get this, what do we need Ethernet for?'" Saccente says. "We replied, 'Indeed.'" ISDN, with the proper customer equipment, provides users with LAN emulation as well as high-speed, point-to-point communications.

Connectivity issues arose despite general agreement on ISDN. One was the need to support IBM's High-Level Language Application Program Interface (HLLAPI) as a way to provide PC-based 3270 terminal emulation. While most major emulation board vendors support HLLAPI, ISDN does away with those familiar adapter boards.

Tenneco needed a program to extend HLLAPI support over an ISDN switched network. The board vendors, which were hardly being flooded with ISDN inquiries, have made some progress toward adapting their programs to meet Tenneco's needs. They still have some way to go, however, Saccente says.

Users familiar with LANs and wires did not know what to do with the magical ISDN station sets. "ISDN was presented out of context in an application sense," Simmons says. "We had to integrate it into an IBM environment."

This integration required evaluation and selection of a standard set of tools carefully presented to users as a selection of "certified" products to avoid generating resistance to the new regime. As was the case with HLLAPI products, this effort often required some customization.

It is popular to believe that MIS organizations will resist ISDN that emerges from a telecommunications base, but Tenneco did not find such resistance. MIS accepted "transparent data communications as the delivery vehicle for the MIS product," Saccente says.

Management at Tenneco says ISDN has succeeded so far. "ISDN has proved out even through a major organizational change," Saccente says, referring to Tenneco's restructuring and selling off of the Tenneco Oil subsidiary.

But even supporters such as Saccente and Simmons admit there are some issues that still need further study. A better solution to 3270 connectivity is needed, and generalized software for LAN support would help ISDN penetrate the LAN-oriented applications. Many of these improvements will involve permanent connections "nailed up" to support the equivalent of dedicated lines. The need for permanent, dedicated lines would take away ISDN's major cost advantage over leased lines: the fact that customers only pay for actual connect time rather than set monthly rates.

While Tenneco has had no use for packet switching until now, the packet-mode ISDN D channel turned out to be the only way users could access the modem pool provided at Southwestern Bell's central office — which provides their link to the outside world. "We were told at first that it wouldn't be available," Simmons recalls. "It became almost mandatory in the end."

Most Tenneco users seem comfortable with ISDN, though there are still some of the annoying disconnects that accompany the introduction of any new phone system and always seem to plague the lines serving board members and executives. Most users make and receive phone calls, use the D channel to send packet data and check out the identification of callers as though it were a normal procedure.

Overall, Saccente and Simmons report, the implementation of ISDN was no more complex than any other telecommunications project of similar scope. They say that the ease of Tenneco's ISDN transition was due in large part to the project's focus on business issues and applications rather than on buying the technology for its own sake. •

IT IS POPULAR to believe that MIS organizations will resist ISDN that emerges from a telecommunications base, but Tenneco did not find such resistance.

"...Computerworld Response Cards reach our market. I know this because we got 260 cards back right away."

Carlos Cadalzo is president of Integrated Systems Technology, Inc., a 10-year old CICS consulting company that recently began marketing PC-based development tools for on-line systems.

The company created the Quick Screen 3270, a development tool that helps analysts design screens for CICS and IMS/DC systems — without requiring a programming background. The next step was to determine the best way to reach the buying market for this new tool. And for Carlos, the first option that came to mind was *Computerworld.*

"I wasn't sure exactly how to do it, but I knew that Computerworld *reaches the people we want to talk to. So when I met with a* Computerworld *sales representative and described the situation, he suggested* Computerworld *Response Card decks.*

"The result was great news all around. I learned there is definitely a market for the Quick Screen 3270 — and that Computerworld *Response Cards reach that market. I know this because we got 260 cards back right away. And four weeks later they were still coming in, which is also very impressive.*

"At first we were concerned that we didn't have the resources to do a full market study, but the cards told us everything we needed to know. We got both quantity and quality in terms of responses. At least 20 cards came back from Fortune 500 companies alone.

"Now that we know the power of these cards, we plan to continue advertising through them in the future. I certainly recommend them for test marketing, advertising and anything else that requires reaching a large and receptive audience."

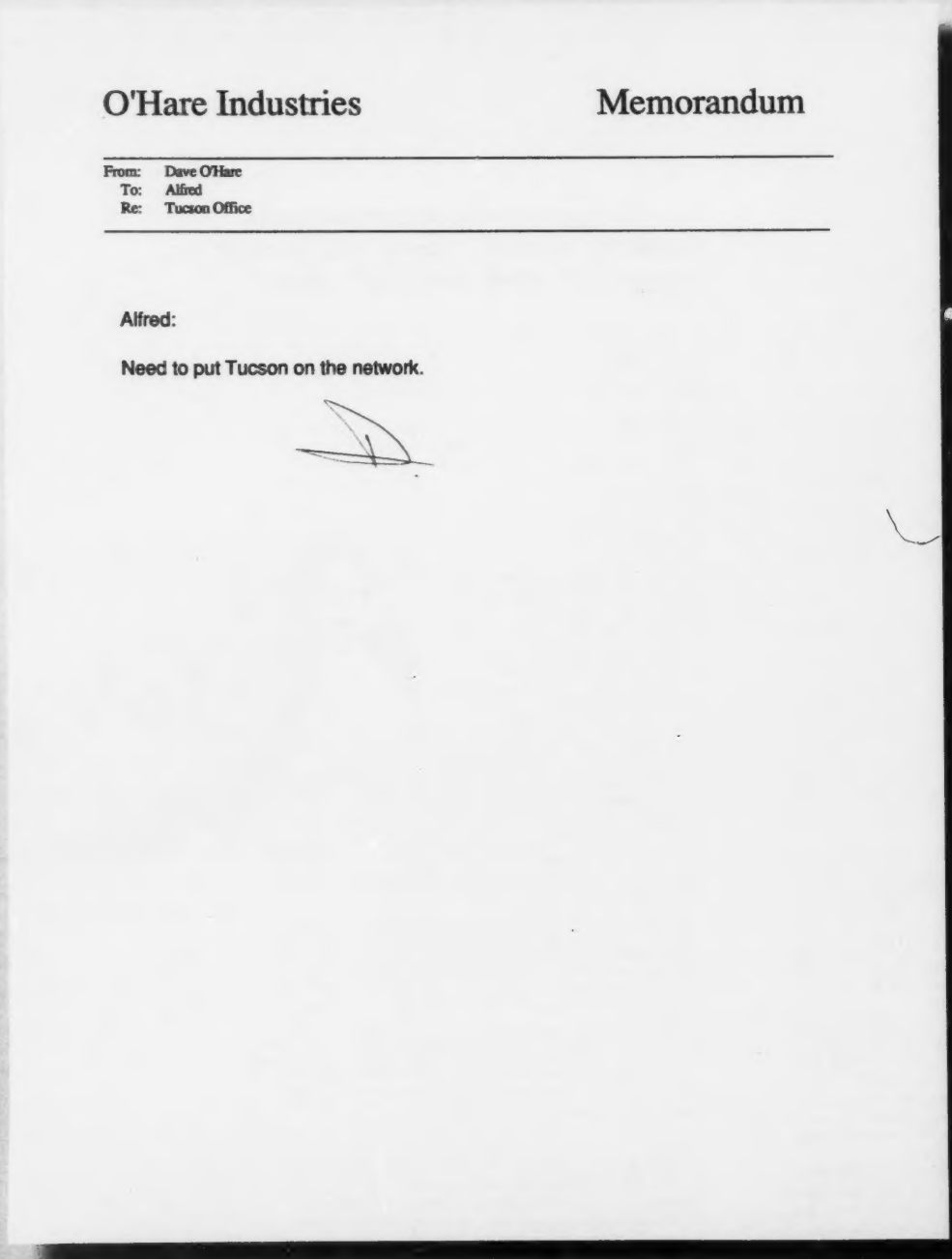
— Carlos Cadalzo
President
Integrated Systems Technology, Inc.

Computerworld Response Card decks give you a cost-effective way to reach a powerful buying audience of over 127,000 computer professionals. They're working for Carlos Cadalzo and Integrated Systems Technology, Inc. — and they can work for you. Call Norma Tamburrino, Account Manager, *Computerworld* Response Cards, at (201) 967-1350 to reserve your space today.

COMPUTERWORLD RESPONSE CARDS

Computerworld is an IDG Communications Publication

WE CAN TAKE SOMETHING THIS COMPLICATED,



O'Hare Industries Memorandum

From: Dave O'Hare
To: Alfred
Re: Tucson Office

Alfred:

Need to put Tucson on the network.

At 3Com, we network more types of systems to more types of systems than anyone else. Even systems you never planned on networking.

Like the two dozen UNIX® workstations that suddenly appeared after the last reorganization.

Or all those minis you inherited thanks to your company's latest merger.

How does 3Com do it?

Well, for one thing, we make more modular networking products than anyone else.

Everything from adapter boards to network operating systems to servers, bridges, and gateways. To help you comfortably adapt to a changing business world.

Every 3Com product is built upon a platform

NETWORK ADAPTER CARD.

Fill out and mail this card, and we'll help you create networks that adapt to your business. So your business won't have to adapt to your network.

☐ Please have a salesperson contact me immediately.

☐ Please send more information about 3Com and its more than 350 products.

Or, for immediate attention call us at 1-800-NET-3Com, Dept. SF.

3Com

We network more types of systems to more types of systems.

Name _____

Title _____

Company _____

Street _____

City, State, Zip _____

Country _____

Daytime Phone _____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

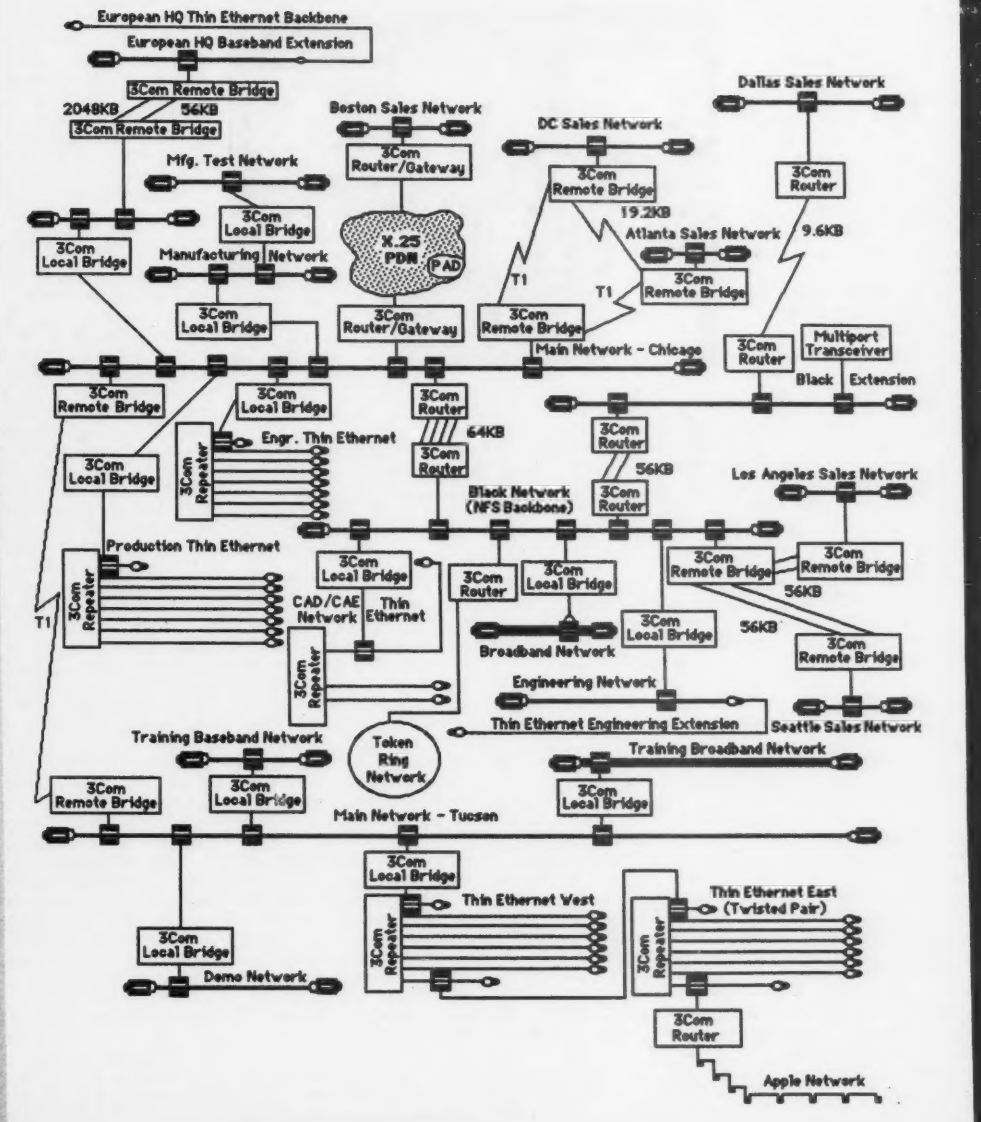
BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 1883 SANTA CLARA, CA

POSTAGE WILL BE PAID BY ADDRESSEE

3Com Corporation
Dept. SF
3165 Kifer Road
P.O. Box 58145
Santa Clara CA 95052-9953

AND SIMPLIFY IT.



of established industry standards. And each one is backed with a variety of comprehensive service and support options.

It also wouldn't hurt to know that 3Com has implemented over 80,000 different networks.

So it's safe to say we've solved our fair share of networking problems.

To find out how we can help solve yours, all you have to do is call 1-800-NET-3Com, Dept. SF.

See, simple.

3Com

We network more types of systems to more types of systems.™

©1990 3Com Corporation. 3Com is a registered trademark of 3Com Corporation. UNIX is a registered trademark of AT&T Information Systems.

Weyerhaeuser paper mill: From back issue to front line with CIM

BY BRUCE RICHARDSON

Two decades ago, Weyerhaeuser Co.'s New Bern, N.C., facility was one of the first computer-controlled pulp plants — and as such was considered state of the art. But as the years passed and no further innovations were made, the plant slipped off the leading edge. Until recently, it was using its original IBM 8100, which the vendor stopped supporting in 1985, and a Bridge Communications Corp./3Com Corp. network that kept crashing.

When management finally decided to upgrade its computer systems a little more than a year ago, the initial aim was simply to migrate from the obsolete system and fix the network.

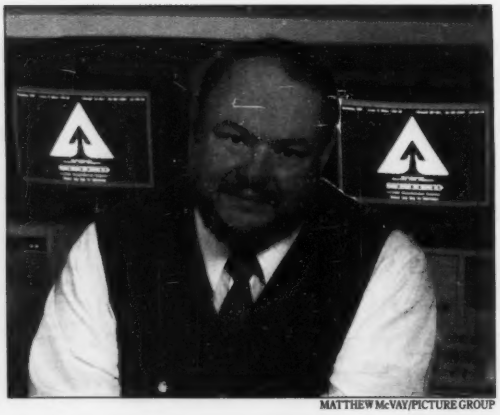
But with the help of the corporation's Weyerhaeuser Information Systems (WIS) unit, the mill has implemented a far more ambitious project — a plantwide computer-integrated manufacturing system. The program's paybacks have included better responsiveness to customer needs, lower production costs and the ability to pinpoint potential problems in the plant in hours instead of days.

In the mid-1980s, the mill had installed a Bridge personal computer network for file sharing and electronic mail. Network crashes soon became more frequent. Electronic messages were getting lost, which was a nuisance; loss of critical data was a more serious problem that required immediate action.

The first step was to provide some stability to the Information Systems group, which was responsible for the network. As an initial step in addressing these problems, Carroll G. Ipock II, a 19-year Weyerhaeuser veteran with experience throughout the mill, returned to manage the mill's six-person information systems group.

One of Ipock's first moves was to call Dan Miklovic, manufacturing automation engineer at WIS, to New Bern to spend three days meeting with mill management to discuss the network. As a result of the meeting, the mill decided to implement a new network and a new Millwide Information System capable of accommodating future systems such as the Maintenance and Materials Information System now under development.

Richardson is a vice-president at Advanced Manufacturing Research, Inc. in Cambridge, Mass.



MATTHEW McVAY/PICTURE GROUP

"CHANGING THE network to TCP/IP would have taken away people we needed to support the computer systems."

DAN MIKLOVIC
WEYERHAEUSER

A review committee found that most networking problems arose from poor installation of software upgrades, loose network connections and improper mounting of transceivers.

A decision was made to redesign the existing fiber-optic and baseband cabling systems and switch to Digital Equipment Corp.'s Decnet. Transmission Control Protocol/Internet Protocol (TCP/IP) and Manufacturing Automation Protocol (MAP) were also considered.

"We could have salvaged the Bridge network by changing the protocol to TCP/IP, but this would have taken away people we needed to support the computer systems," Miklovic says. MAP was rejected because it was not supported by all of the vendors that the mill uses.

The mill chose DEC as the primary vendor for the plantwide systems architecture partly because its equipment could run the software being considered for IS projects. Also, Weyerhaeuser had a large Vaxcluster and support staff that could assist the mill.

Decnet became the new network protocol and Oracle Corp.'s Oracle the relational database management system standard. Oracle was chosen over DEC's RDB because it was the only package supported by Synergen, Inc., the software company selected for the maintenance management system.

A key element of the IS platform is "people integration," which includes making production data accessible to all workers as well as training them in the use of the systems, Ipock says. This effort was part of the mill's new participative approach.

"One important component was having a common user interface across our systems to minimize complexity," Ipock says. The group decided to standardize on Walker, Richer and Quinn, Inc.'s Reflection software, a VT340 terminal emulation package that provides access to VAXs, the HP 3000 or other remote Weyerhaeuser sites.

Challenge: Eliminate network crashes, improve responsiveness to customers, lower costs, speed up troubleshooting.

Response: Upgrade to DEC VAXs; standardize database, interface and factorywide networking system to support CIM.

The group wanted its Millwide Information System to provide a window into all processes. Several software products were reviewed before settling on Prosmart, a VMS-based package developed internally by Weyerhaeuser's IS department.

The Prosmart system allows the mill to place decision-making responsibility at the appropriate level. For example, an operator starting a new pulp run can review Prosmart's database for variables used in previous runs. Up to one year's worth of data can be retrieved in seconds.

The operator could then review cost trade-offs of a particular grade with a set of bar graphs on the individual and total cost per ton of additives. By comparing the costs of the different mixes, he can meet the customer's quality standards at the most cost-effective price.

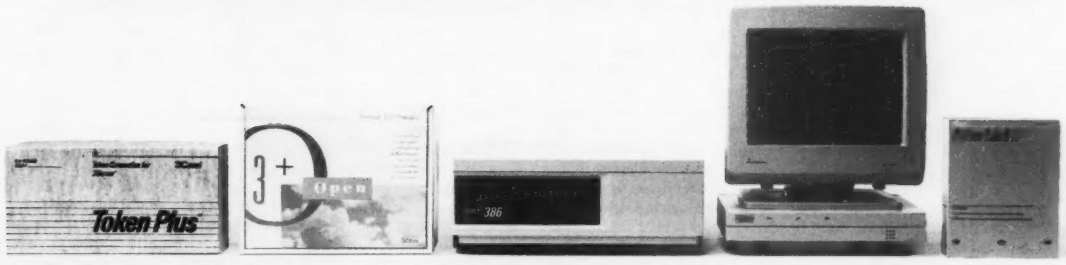
The network now supports more than 170 devices, including all hosts, control systems, terminals and PCs. To date, the total cost for the new technology is in the millions of dollars. Payback for the Millwide Information System/Distributed Control System has been estimated at less than 18 months. Ipock cites one process manager who was able to cut chemical costs $5 per ton by providing operators with needed information.

A key benefit of the system is the ability to isolate problems as they occur, Ipock adds. For example, the mill was having problems with a critical chemical preparation process. "We thought the problems were from fluctuations in steam header pressure," Ipock says. The new system allowed the plant to identify the real cause of the problem in hours, rather than days.

During the last three months, Ipock's group has trained more than 40% of the mill workers, many of whom had never run a PC, to use the system. For example, a foreman with no previous graphics training now creates his own applications to monitor his process. "He has trained his whole shift and other operators too," Ipock says.

Overall, the mill is happy with the new information system and network, as is Weyerhaeuser's IS department. The key, Ipock says, is to "choose friendly territory for the first implementations, then increase the visibility with each success. We have created a receptive environment for new technology." •

AS POWERFUL AS ALL YOUR COMPUTER SYSTEMS PUT TOGETHER.



3Com can pull all your computer systems together into one very powerful network. In fact, no one networks more types of systems to more types of systems.

You can use the new 3+Open™ LAN Manager. The first OS/2™-based network operating system which allows you to connect all your present computer systems, whether they're DOS, UNIX®, Macintosh® or IBM® hosts. As well as supporting the OS/2 LAN Manager distributed applications to come.

Or hundreds of other modular hardware and software products that give you maximum network performance. From workgroup servers and network workstations to network management tools. From Token Ring and Ethernet adapter boards to a line of Macintosh integration products.

All of which let you network workgroup to worldwide.

So talk to us. We can put it all together for you.

3Com®

We network more types of systems to more types of systems.

3Com and 3+Open are trademarks of 3Com Corporation. Macintosh is a registered trademark of Apple Computer, Inc. IBM and Operating System/2 are trademarks of International Business Machines Corporation. UNIX is a registered trademark of AT&T Information Services.

Giants shake hands at G. D. Searle via a bevy of DEC-to-IBM gateways

RALPH HEFTOFT/PICTURE GROUP

Addison *'makes do' with DEC-IBM connectivity*

BY JOHN KADOR

User demand for transparent access to both IBM and Digital Equipment Corp. hosts led G. D. Searle & Co. on a far-ranging search for gateways, file transfer software and other products to connect the two types. As a result, the company's manager of technology planning, Keith Addison, has become an expert on the comparative pluses and minuses of various vendor offerings. His conclusion: There is no "perfect" DEC-to-IBM connectivity system available — trade-offs abound; so companies like G. D. Searle must make do with a combination of gateway products.

The need for DEC-to-IBM connectivity at Searle was accelerated by its acquisition by Monsanto Co. Searle had been highly decentralized, deploying its computer systems in the traditional dichotomy: IBM systems were concentrated in sales and business support activities, and DEC VAXs were used exclusively in research and development for drug design, statistical analysis and other scientific applications.

The acquisition prompted a strong movement toward centralization and interconnected systems across the board, according to Addison. Management clamored for standardization in such areas as word processing software, electronic mail and printer support. "We found we were putting more emphasis on 'let's do it all the same way,' " he recalls.

At the same time, individuals were relocated among departments, and people experienced with DEC workstations found themselves having to use IBM equipment instead, and they missed some of the tools available to VAX users. The situation was similar for people who were familiar with the IBM tool set — they suddenly found a DEC workstation on their desks.

Four in the hand

Two years ago, Searle began installing different vendors' products to interconnect its disparate IBM and DEC systems. It now uses no fewer than four separate products, matching the gateway to the requirement at hand. "All four systems address our needs for interconnectivity a little differently," Addison says.

The first system installed was DEC's original Decnet/SNA Gateway, which provides a network attachment between a Decnet network and an IBM 3275 controller. However, the gateway can only support speeds of up to 56K bit/sec. and a maximum of 32 logical sessions. "We have a potential throughput problem because the gateway is used for both remote job entry and 3270 interaction," Addison says. "It doesn't take long before a number of sessions across that channel degrade performance."

Searle's second gateway installation was Flexlink International Corp.'s Flexlink, a high-speed data transfer package that allows DEC- and IBM-trained people to edit files on either side under VM, using the editor they feel the most comfortable with. The package runs on Intel Corp.'s Fastpath, a box that supports an IBM host channel connection on one side and up to six VAX Multibus connections on the other side.

The pharmaceutical company also implemented Interlink Computer Sciences, Inc.'s 3711 gateway, a channel-attached device that makes an IBM system look like a Decnet node. Supporting high-speed file transfer, it is particularly useful in applications that connect Searle mainframes to Monsanto corporate systems.

Finally, Searle installed J-net from Joiner & Associates, Inc. Based on the Remote Spooling Communications Subsystem, the IBM protocol used by IBM's Professional Office System, J-net is Searle's primary package to send E-mail messages from DEC to IBM systems and vice versa. It also allows VMS users to exchange files and real-time messages with IBM users.

Searle's array of DEC-IBM gateways has given it the flexibility to move between environments without adding hardware, Addison says. By bridging the IBM and DEC environments, Searle allowed its user groups to access both environments with the one set of equipment they are accustomed to. For example, members of one group use their DEC terminals for word processing and routine processing and to log on to an IBM host to extract data from a financial database. They can then direct printouts to their DEC laser printer.

SNAPSHOT

Challenge: Provide for transparent user access between DEC and IBM systems.

Response: Balance cost/performance trade-offs among four commercial DEC-IBM gateways and file transfer programs.

Printing provides another illustration of the value of the links, according to Addison. Without connectivity, groups that included both DEC and IBM users would need two printers within the unit. "By having one printer connected to both DEC and IBM environments, however, we save space, money and operating effort, plus support on the MIS side in terms of training and supplies," Addison says.

His exploration of the DEC-IBM connectivity market has provided no easy answers, only cost-performance trade-offs, he says. J-net, for example, requires millions of instructions per second but only on the DEC side. Interlink is a pure hardware solution. Flexlink is a third-level trade-off: It is a hardware system that imposes software overhead on both the DEC and IBM ends of the gateway.

Jack James, Searle's manager of Statistical Computing Support Services, is one user seeking more seamless integration of the DEC and IBM networks. Currently, Flexlink is the file transfer mechanism of choice for his group's clinical research studies. Searle's clinical data bases are stored in the VAX environment; most of the statistical analysis is done on the IBM side.

"While the file transfer itself is handled quite smoothly, we still find that the level of technical expertise required to get things back and forth is higher than we want it to be," James says. Nor is he optimistic in the short term that either DEC or IBM will address these concerns. He says he will look to Searle's internal resources first.

Addison's next challenge is to improve the functionality of document transfer to allow both the movement and translation of documents from various workstations, PC-based or otherwise.

He is also facing a vexing printer technology problem: While users can dump graphics from a personal computer to a Hewlett-Packard Co. Laserjet printer, they cannot take the same output and dump it into an IBM host printer.

Another question is whether Searle can justify replacing its comparatively clunky Decnet SNA Gateways with the vendor's recently announced Decnet SNA Gateway-CT. This product is a channel-attached device that reportedly supports throughput of more than 1M bit/sec. in speed and 255 logical sessions.

However, Addison says, "There's no incentive for anyone going in and replacing installed gateway systems that are working." The bottleneck is really not all that serious, he adds. •

Kador is a free-lance writer based in Geneva, Ill.

OS/2. EVEN IF YOU DON'T WORK WITH IT, DON'T NETWORK WITHOUT IT.

So you haven't bought into OS/2™... yet.

That's certainly no reason to deprive yourself of OS/2 LAN Manager's impressive networking capabilities.

With 3Com's 3+Open™ LAN Manager, the first OS/2-based network operating system, you can't go wrong. It allows you to connect all your present computer systems, including DOS, UNIX,® Macintosh® and IBM® hosts. As well as supporting the OS/2 LAN Manager distributed applications to come.

Your network will be noticeably enhanced by the high speed resource sharing, security and network management features of the 3+Open product line.

And with network applications like electronic mail, internetwork routing and remote network access, as well as a full range of 3Com® adapter boards, servers and workstations, you can network workgroup to worldwide.

So whatever you do, don't network without talking to us.

3Com®

We network more types of systems to more types of systems.

3Com and 3+Open are trademarks of 3Com Corporation. Macintosh is a registered trademark of Apple Computer, Inc. IBM and Operating System/2 are trademarks of International Business Machines Corporation. UNIX is a registered trademark of AT&T Information Services.

Bechtel consolidates its global reach with satellite links to remote sites

BY PHILIP J. GILL

Flexibility is key to the business of worldwide engineering and construction, according to Bill Howard, vice-president of information technology at Bechtel Group, Inc. Flexibility means being able to move into new locations quickly, and for Howard, that means absorbing new communications technologies and networking strategies.

From the firm's downtown San Francisco headquarters, Howard's information technology group oversees all of Bechtel's information technology services, including local, national and international voice/data communications functions.

Bechtel consists of more than half a dozen semi-independent business units circling the globe. All these units have distinct voice/data communications requirements along with the need to exchange information.

Like the company itself, Bechtel's worldwide network is not a single network but many smaller ones. Voice lines connect about 50 offices in the U.S., while data lines connect about 20 offices nationally. Internationally, the firm maintains a dedicated 56K bit/sec. line to its London office, while public networks provide links to half a dozen countries, including Saudi Arabia, Brazil, Japan, Taiwan and Hong Kong.

Recent shifts in Bechtel's business have driven its search for network flexibility, according to Ray Pardo, information services manager at Bechtel Power Corp. in Gaithersburg, Md. "In 1980, we had 50 to 80 very large to superlarge projects, with durations of several years or more," he says. "In 1982, we knew our work load for four to five years into the future."

The era of mega-projects has pretty much ended for Bechtel, as well as for other construction and engineering companies. The company's work load now consists of several hundred small to medium-size projects, most of which last only three to 18 months. Therefore, waiting 90 days for telecommunications carriers to put in trunk lines to a site is unacceptable, according to Pardo. The company might need to rapidly establish voice/data communications links to virtually any part of the globe. "We must be able to move in quickly to mobilize and demobilize," Howard says.

In the early 1980s, an in-depth management study of Bechtel's voice/data communications needs determined that its leased and private phone lines were not the answer. The report recommended installing an internal, private satellite communications network to handle all internal voice/data traffic. Bechtel started leasing equipment from Satellite Business Systems (SBS) in 1980 and is in the process of buying that equipment from MCI Communications Corp., which now owns SBS.

Bechtel has established regional centers in San Francisco, Gaithersburg, Houston, Ann Arbor, Mich., and Los Angeles. From these centers, "spoke" links radiate to dozens of Bechtel's local offices across the country. The Gaithersburg office also provides the link to London, headquarters of the firm's Bechtel Ltd. subsidiary.

Satellite communications provides shorter setup times, allowing Bechtel employees to establish an office in days or weeks rather than months. It also cut costs, a top priority in the wake of the accident at Pennsylvania's Three Mile Island nuclear power plant and other incidents in the nuclear power industry, which have squeezed Bechtel's bread-and-butter business.

Howard says he expects the number of PCs and terminals in place to double over the next three to five years from the present count of about 5,000. Eventually, Bechtel's goal is to "link every intelligent terminal on every worker's desk," he says.

To add more flexibility to its network, Bechtel is currently investigating the potential for very small-aperture transmission (VSAT) devices, according to Bob Burke, a member of the company's network planning team. Because of their size and transportability, VSAT devices can attach to a window ledge or even to the roof of a truck.

Burke says VSAT will enable Bechtel to go places where it could not go before and where regular phone lines have never gone. "VSAT means that we can afford much greater bandwidth than we had before," he adds.

This ability will soon be important as Bechtel supports greater graphics capabilities and allows work groups around the world to work on the same projects, says Mark Bigelow, a chief architect of the network.

Bechtel is not planning to rely entirely on satellites for its wideband communications, however. About the time the company was completing its satellite network, long-distance carriers started marketing fiber-optic links as a low-cost, reliable transmission medium. Bechtel now uses MCI's fiber-based terrestrial lines when it can but still needs satellite-based links to reach remote regions where fiber-based links are unavailable, Pardo says.

The company wants to maintain this hybrid network, retaining the option of shifting back and forth between terrestrial and satellite links as price and performance trade-offs change.

Bechtel also uses a mix of protocols; no one vendor offers a networking system to fit users' diverse needs, Bigelow says.

Data communications networks include IBM's Systems Network Architecture, an Ethernet-based Digital Equipment Corp. Decnet for computer-aided design and engineering, a Unisys Corp. telecommunications network and dozens of personal computer networks.

Such a plethora of protocols, while directly addressing business needs, has created problems when connecting two types of systems. One current project uses protocol conversion to ease communications between incompatible networks and computers.

For the long term, Howard says that Bechtel has made a commitment to migrate its network and data communications facilities to the emerging Open Systems Interconnect networking standard. Bechtel is also looking at the emerging Integrated Services Digital Network standards. The company is an active participant in the Corporation for Open Systems.

However, Howard says, Bechtel "will not abandon functionality" in favor of standards. In those cases where proprietary networks and systems better match the needs of the environment, the company plans to stay that course, he says. •

BOB HOLMGREN

Bechtel's *Burke, Howard and Bigelow (left to right) providing network flexibility*

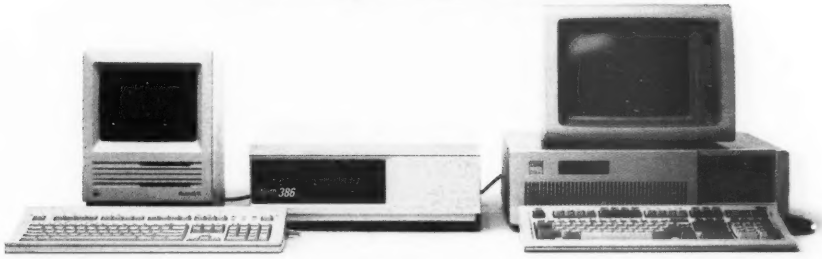
Gill is a San Mateo, Calif.-based freelance writer.

SNAPSHOT

Challenge: Adapt to a new environment demanding faster implementation of connections to job sites worldwide.

Response: Deploy an internal, hub-and-spoke satellite network with protocol conversion systems and possible use of VSAT dishes.

BETWEEN MACINTOSH AND PCs, MOST PEOPLE CHOOSE 3Com.



Since 3Com first made integration between Macintosh® and DOS systems possible, the competition between the two has changed to full cooperation.

Today, there's a complete line of products that integrate Macintosh, DOS and even OS/2™ systems with the most powerful workgroup capabilities available.

3Com® network servers let you use your Macintosh, with its familiar interface, to connect Macintosh and DOS systems together.

3Com adapter boards let you plug Macintosh systems right into your Ethernet LAN.

And 3Com's electronic mail software lets you easily communicate between your DOS and Macintosh systems workgroup to worldwide.

No other company offers so many proven ways to get your DOS and Macintosh systems working together.

Talk to us, we'll show you why 3Com is the network of choice.

3Com®

We network more types of systems to more types of systems.

3Com is a registered trademark of 3Com Corporation. Macintosh is a registered trademark of Apple Computer, Inc. Operating System/2 is a trademark of International Business Machines Corporation.

WE NETWORK MORE TYPES OF SYSTEMS TO MORE TYPES OF SYSTEMS.

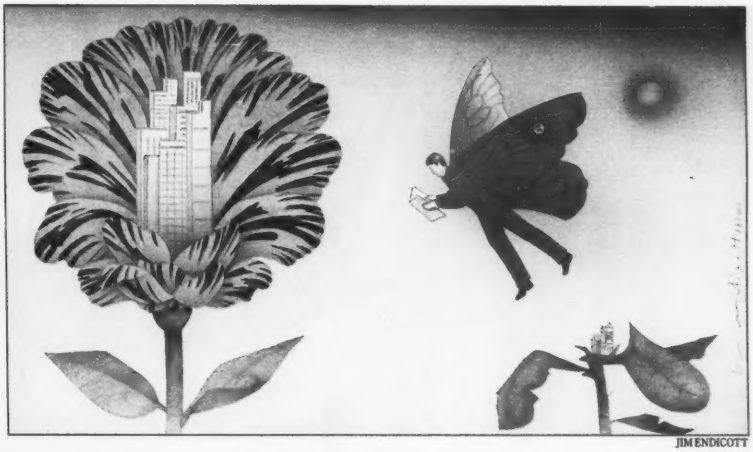
3Com

See us at Communication Networks '89 Booth 614.

Mini makers seek fresh opportunities for growth

As use of stand-alone minicomputer wanes, vendors turn to PCs, LANs

BY HELEN PIKE



JIM ENDICOTT

Vacuum tubes, Eniac, the Altair and . . . the minicomputer. Yes, the minicomputer. It could be retired into history sooner than you think. In fact, as a word, it may disappear sometime in the not-so-distant future.

The more frequently marketed term MIS managers are hearing at the close of the 1980s is "server." But just as minis are no longer stand-alone machines, neither are servers the sole offerings from mini manufacturers. Open platforms, data and telecommunications, software to create specific applications and better customer support are telltale signs of diversity. They bespeak the efforts of established mini makers that are coming to grips with a market that, instead of shaking out, is heating up with new technologies, terms and niche players.

Every minicomputer company has had to bring out boxes with multiuser applications and communications in order to compete with younger, more aggressive networking companies such as 3Com Corp. and Novell, Inc., according to John Logan, vice-president of the Aberdeen Group, a Boston consulting firm.

"Minicomputer companies are doing a better job of capturing PC market share [than mainframe companies are] and as coordinators of work-group computing by pulling it all together with an integrated LAN," Logan says.

These trends are best evidenced by the leaders of this industry, such as Digital Equipment Corp. In 1984, DEC replaced the established VAX-11/785 minicomputer architecture when it introduced its first clustered computer, the VAX 8600. DEC followed that up with networking technology linking all the newly created levels of distributed processing power. After the 8600 rollout, the company "stopped talking about minis," says William Steul, vice-president of DEC's Corporate Systems Group in Marlboro, Mass. "The term 'minicomputer' [was] not meaningful anymore."

What is more meaningful at DEC now is software, and the firm says it believes its next step is into application-specific software. Later this year, it intends to emphasize what is commonly called computer-aided software engineering, or CASE, but DEC would like to see the first three letters come to be known as "commercial application software," according to Steul.

"We look at CASE as our Trojan horse for selling the rest of Digital's features," he says. The company is taking direct aim at "three quarters of all commercial systems coded in Cobol."

CASE tools will give end users more control of applications development and, with artificial intelligence elements, it will help them to avoid reinventing the applications wheel, Steul says; he estimates that companies spend 80% of their time simply maintaining old applications.

The follow-on business from CASE, besides hardware sales, would be networking customers' main systems and laying down network backbones, he explains. "As MIS connects all those PCs out there, network management and service will be in high demand," he predicts.

DEC punch

All of which doesn't mean DEC is turning down the burners on hardware sales. It delivered the first part of a one-two punch earlier this month with the introduction of a variety of low-cost desktop computers aimed at Fortune 1,000 accounts in which DEC has a presence alongside IBM and Sun Microsystems, Inc. personal computers and workstations. It followed that debut with last week's rollout of a new series of higher performing VAXs.

"It reinforces our commitment to give customers the best solution even if we have to go outside the company," Steul

Pike is a senior writer for *Computerworld's* new bimonthly magazine, *Focus on Integration*, due out next week.

- **Adding multiuser applications**
- **The minicomputer as server**
- **Selling around the network, not the machine**

says, referring to the recent products netted from alliances with Mips Computer Systems, Inc. in Sunnyvale, Calif., for a reduced instruction set computing (RISC)-based 15-million-instructions-per-second (MIPS) desktop machine that can run Unix applications; from Tandy Corp. in Fort Worth, Texas, for a trio of IBM-compatible PCs; and even from IBM for tape drives.

But, Steul adds, "Over time, hardware and operating systems will fade into the background because [software] services will be at a higher level."

If CASE is the Trojan horse at DEC, at Hewlett-Packard Co. it is networking. While DEC spent the early January weeks fanning the flames for a possible mid-range price war, the Palo Alto, Calif., company quietly advanced its cooperative computing environment strategy. Later this summer, HP says, it expects to ship the first local-area network manager on IBM and Microsoft Corp.'s OS/2 that is scalable to Unix-based systems.

AS THOUGH mirror images of each other, both DEC and HP are capitalizing on the commercial market.

"HP doesn't sell boxes anymore," comments one HP product manager. "It sells around the network, not the box." So whither HP's minicomputers?

"Minis will still be around, but [they will be] increasingly in networks," observes Dick Watts, marketing director for HP's newly restructured Computer Products Sector. "There is an evolution toward a mini really becoming a server on the network, with, ultimately, no terminals attached to it. It's a ways off; it'll happen in the mid-'90s."

As though mirror images of each other, both DEC and HP are capitalizing on the commercial market as a place to sell machines and applications once used only by the technical community. "Five years ago, we had different machines to run different applications. Now we can use the same machines to do all the same types of applications," says Watts, a 20-year HP veteran.

Also like DEC, HP's focus on Unix, RISC, software development, strong networking and a low-end computer strategy are part and parcel of the company's marketing focus in 1989.

"The similarities in our strategies point to what the customer wants, rather than to the companies doing proprietary products," Watts explains. "The market has really woken up."

Last November's product-line restructuring, designed to shake off HP's slumber, allows it to pursue a dual approach for selling into the mid-range: desktop devices to be sold through indirect channels and high-end systems based on networked minicomputers sold by HP's direct sales force. The common thread will be connectivity.

"We will emphasize networking that gives users multivendor independence," Watts says, referring to HP's research and development investment in the International Standards Organization's Open Systems Interconnect after deciding to drop its proprietary network protocols.

Another firm that strongly competes in mid-range computing — though it has never directly hyped its offerings as minis — is IBM. The Application System/400 debut, however, gives IBM a consolidated focus on mid-tier computing that coincides with an effort to integrate its disparate platforms into a single architecture — Systems Application Architecture (SAA) — by the next decade.

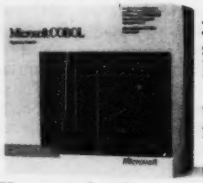
As a result, IBM's big mid-range push in 1989 will be on third-party software development for the AS/400, the Personal System/2 and the 370 — all big pieces of SAA — so "users can move from any architecture to SAA if they want to," according to Bill Grabe, vice-president and assistant general manager of marketing for IBM's U.S. marketing group.

To Grabe, a 27-year IBM alumnus, the word "minicomputer" is never a good one where primary business is conducted. And "server" is too narrow a concept, he says. "As we

You'll never have to wait for a mainframe again.

Microsoft just eliminated a 3000-pound headache for mainframe programmers. With Microsoft® COBOL Optimizing Compiler 3.0.

Now instead of endlessly waiting for mainframe time, you can bring your COBOL programs right down to the PC on your desk. Suddenly you've got control unknown in other platforms, as well as serious speed and power.



You've got full MS® OS/2 support to let you break the 640K memory barrier.

You've got fast execution because Microsoft COBOL is now a native code compiler.

You've got a rich development environment thanks to the Microsoft COBOL Animator source level debugger, Microsoft Editor and other powerful utilities.

One final assurance. Because Microsoft COBOL 3.0 is now mainframe COBOL compatible, you'll enjoy a seamless flow of source code between mainframe and PC environments.

Feel free to also enjoy the highly technical information in the adjacent column. Then call us at 800-541-1261 for more information and the dealer nearest you.

The mainframe wait is over with Microsoft COBOL 3.0. Appearing soon on a PC near you.

Microsoft
Making it all make sense.

©1989 Microsoft Corporation. Microsoft, the Microsoft logo, MS and MS-DOS are registered trademarks of Microsoft Corporation. Microsoft COBOL Optimizing Compiler 3.0 is based on COBOL/2 from Micro Focus.

go forward, there will be more niches and special functions with machines aimed at those markets. To me, server is just one application."

Grabe is not alone in his observation about the changing minicomputer market. Ward MacKenzie, Data General Corp.'s marketing vice-president and veteran of the minicomputer's heady adolescence from his tenure at DEC, observes, "The underpinnings are changing. Competitors are repositioning themselves. The desire is to grow, rather than maintain, market share. Historical definitions are blurred by technologies that are changing the ground rules by which we place our products."

At DG, that means systems-level technology instead of minicomputers. And in the evolving DG culture, "systems" means the open platform of Unix instead of a proprietary architecture. "Unix is a systems world," MacKenzie maintains.

Developed at Research Triangle Park, N.C., DG's Unix kernel will allow the company's 27,000 MV users "who are redoing their applications and want new flexibility" to transport their software to a Unix platform, according to MacKenzie. The company's DG/UX Revision 4 will be bit-compatible with AT&T's Unix System V. DG/JX will run off Motorola, Inc.'s 88000 RISC chip, which DG expects to start shipping in March.

Telecommunications products are expected to be integrated into the MV family by mid-year. In fact, MacKenzie points out, MV/70000 users already have fiber-optic functionality. This feature forms the groundwork for a joint development agreement with Nippon Telephone and Telegraph Corp. (NTT), he adds. The telecommunications offerings that come from the NTT deal will involve wide-area networking capabilities and telephone-switching products.

As a company already involved in the minicomputer business, AT&T feels its customers today are faced with a melting pot of technology. Steve Lester, 3B2 product management division manager at AT&T's Data Systems Group in Lisle, Ill., imagines customers asking, " 'What does the change in computing and terminology mean to me?' "

To help these users sort that problem out, AT&T is "trying to be more descriptive" in selling the 3B2's capability as a server instead of a mini, Lester says. He concedes that the AT&T strategy is not a flamboyant one; rather, he says, the company will push price/performance down while closing the gap at the higher end of computing so there can be more users networked into a system.

Lester declines to reveal the current installed base for the AT&T 3B2 line, but he does say the Data Systems Group's mandate in 1989 is "to help [current] customers expand their performance. . . . It's a beefing-up more than an adding-to."

Along with an expected emphasis on Unix, AT&T will focus on adding Integrated Services Digital Network into the 3B2 line — "like a card," Lester says, that will be a direct connect instead of a data switch. "There will be a standard interface into the 3B2 line instead of going through a multiplexer."

Another firm that could benefit from a successful marriage of data and telecommunications technologies is Wang Laboratories, Inc., the minicomputer vendor that has met frustration in bringing its own telephony dreams to market.

But realizing that voice is still not a technology from which any computer company is making money, Wang has re-channeled its research and development funds into imaging technology, because "the amount of paper that's out there is enormous," says Ken Ilsa, Wang's worldwide marketing vice-president.

"Most companies have been focusing on DP and have been reluctant to add WP," Ilsa says, referring to the management of statistical, rote information over textual and interpretive, or word processing, data. Wang proposes to have users take a leap into the next technology — imaging — in order to bring information back under control.

"Integrating image with the rest of processing is more important than squeezing the next 1% out of DP," Ilsa says about writing new but traditionally DP-only programs. Already the firm has 40 imaging applications available in the U.S. It hopes to quadruple that number here and overseas by the end of 1989 for a total of 160 imaging programs, Ilsa says.

Wang is also beating the drum for Unix as a way to do business by driving DP costs down and helping the MIS manager make more money. In certain applications, such as payroll, Unix is cheaper to run, Ilsa says.

To help MIS do better business, Wang is trying to do its business better. Late this spring, Ilsa says, Wang will come out with a state-of-the-art maintenance billing system for hardware-to-software-to-customer service that Ilsa hopes will put the company ahead of everyone else.

"We want to bring these people back into managing information by using technology," he adds, referring to the November release of Freestyle, a PC-based program for executives that uses a light pen and writing tablet for creating and sending electronic mail.

With the emphasis on applications and operating systems software, it is not surprising to hear little mention of hardware. To Ilsa, a DP veteran since 1969, "the word 'minicomputer' is meaning less and less. There will be applications servers instead of print servers or whatever-it-may-be servers. Servers and services will be more meaningful," he adds. Nonetheless, Wang is announcing this week a 12-MIPS high-end mini.

Prime Computer, Inc.'s strategy is similar to Wang's. Prime's target market is the Fortune 2,000, for which the Natick, Mass., company has also retooled its minicomputer strategy into one of "service and servers."

"People are becoming more dependent on centralized servers," says Richard Snyder, Prime's R&D and marketing vice-president. The minicomputer/workstation level of computing is changing the role of the box, he says, with the computer becoming a server for shared applications rather than a device to crunch numbers. In effect, Snyder says, the transition means minis have become specialized to function as high-availability database servers, as compute servers and as vehicles for image processing.

> "TECHNOLOGIES are changing the ground rules by which we place our products."
>
> WARD MacKENZIE
> DATA GENERAL

Like its competitors, Prime will be pushing Unix; it has joined Unix International, Inc., the Unix standards consortium that is a rival of the Open Software Foundation. Formerly called Archer Group, Unix International backs AT&T's Unix System V implementation.

There will also be a push to attract more independent software vendors, Snyder says. Prime has nearly 1,000 such firms in its stable as a result of its 1987 acquisition of Computervision Corp.

"We have a view that the [independent software vendors] are moving to network-aware applications," he says.

Network users need a set of tools to make it easy to build "network-intrinsic" applications, Snyder adds. "We want to provide the platforms — not all the applications on which to build distributed applications." •

Microsoft COBOL Optimizing Compiler Version 3.0 for MS OS/2 and MS-DOS®

Complete COBOL Solution for Application Maintenance and Development on the PC.

- Develop and port large mainframe applications on the PC.
- Break the 640K barrier with OS/2 support including dynamic link libraries and multi-thread support.
- Develop programs that run in both MS-DOS and OS/2.
- Compatible with several different COBOL dialects. (IBM® VS COBOL II,™ IBM OS/VS™ COBOL, IBM SAA, Data General, and others.)
- Call Microsoft C and Macro Assembler routines.
- HUGE memory model allows data items to be greater than 64K.
- Full network support with record and file locking including Novell.

Powerful COBOL Development Environment.

- Animator source level debugger. Trace execution, backtracking, breakpoint DO statements, and periodic breakpoints.
- Microsoft Editor, the programmer's editor for both MS OS/2 and MS-DOS. Reconfigurable and extendable editor that even lets you run your programs from within it.
- Incremental linker for MS OS/2 performs partial links up to 20 times faster than a full link—only changed modules are relinked.

ANSI 85 COBOL support.

- Certified HIGH by National Bureau of Standards.
- Structured language enhancements:
  Scope delimiters
  In-line PERFORM statement
  CALL BY CONTENT statement
  EVALUATE statement
  Negated conditions
  Global variables
  Reference modifications
  Nested programs

Native Code Compiler with fast execution.

- 10x faster computations than MS COBOL 2.2.
- 30% faster I/O than MS COBOL 2.2.

Field Service Management Systems

Putting one on-line takes over 100 man-years and 3 million lines of code.

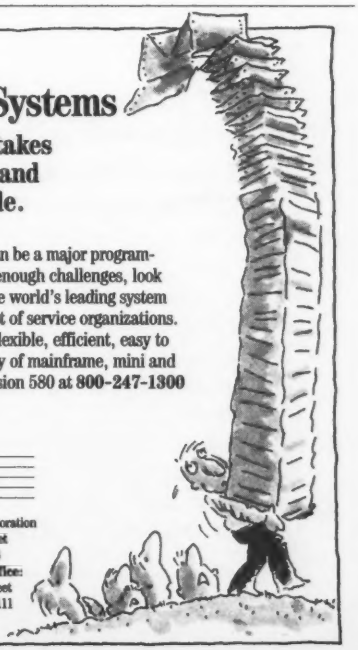
Automating customer service can be a major programming challenge. So if you have enough challenges, look into FIELDWATCH™ software—the world's leading system for the support and management of service organizations.

FIELDWATCH software. It's flexible, efficient, easy to implement, and runs in a variety of mainframe, mini and micro environments. Call extension 580 at 800-247-1300 (617-272-4100 in Mass.).

FIELDWATCH

THE DATA GROUP CORPORATION
A BMC Company

The DATA Group Corporation
77 South Bedford Street
Burlington, MA 01803
West Coast Sales Office:
1750 Montgomery Street
San Francisco, CA 94111



THE STORAGE CONTROLLER

The Amdahl 6100 lets data move between storage devices and mainframes at maximum speed.

For years, most systems have had a huge bottleneck in the worst possible place. Halfway between the storage devices and the CPU. Because a typical storage controller can't begin to handle the traffic. In fact, most of the time, it limits you to only four I/O paths. And channel utilization of 35% or less.

But now, there's a way to eliminate those bottlenecks permanently. The Amdahl 6100 Storage Processor. It gives your system four times the throughput. And twice the capacity.

An intelligent approach.

Instead of blocking traffic, the Amdahl 6100 actually helps it move much faster. At speeds up to 72 MB/second. Because it has the intelligence to control the flow of data on 16 concurrent I/O paths.

As a result, you can build a much more sophisticated storage subsystem. With 240 GB capacity, 32 CPU attachments, 512 MB shared storage, and 16 MB nonvolatile storage.

Yesterday's limits are history.

In the past, the only way to keep access times down was to underutilize some of the most expensive components of your system: DASD space, channels, and controllers. But with data moving along 16 I/O paths, you can use much more of these valuable resources. Without slowing down a bit.

VS. THE STORAGE PROCESSOR.

The old limits on cache are gone, too. With the Amdahl 6100, you get up to 512 MB. But instead of being divided into rigid compartments, our cache is totally flexible. It dynamically adjusts to the environment as you go. No matter how much the workload changes, you don't have to tune across DASD strings trying to keep up.

The faster you go, the less it costs.

When you think about it, this is the most impressive fact of all. Almost 50% of your total hardware budget goes for storage. And in today's systems, you have to look at storage as necessary overhead.

But if you install a 6100 now, it can become an integral part of a balanced system. Reduce the load on your CPUs. Raise your productivity. And lower your overall cost of computing.

In all, this is such a fundamental change in the balance between CPUs and storage devices that it creates the first real system of the '90s. With all its power and capacity, the 6100 lets you grow well into the next decade. And its processor design makes it easy to add new functional and performance enhancements as they're introduced.

So if you'd rather not let a conventional storage controller slow you down, call your Amdahl representative. And we'll help you move into the fast lane.

amdahl®

The Intelligent Choice

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, CA 94088-3470

Smaller firms get specialized

BY J. A. SAVAGE

Challenging the large minicomputer vendors for a share of the evolving mid-range processor market are a host of smaller companies with strategies aimed at specific technologies.

A contingent of companies to watch this year includes Altos Computer Systems, Inc. with an Intel Corp. 80386-based machine, Sequent Computer Systems, Inc. with parallel processor-based systems, Mips Computer Systems, Inc. with its widely licensed reduced instruction set computing (RISC) chip technology, Pyramid Technology Corp. with proprietary RISC technology, Tandem Computers, Inc. with its mid-range CLX line and proprietary operating system and Tolerant Systems, Inc. with its fault-tolerant computers.

Users are likely to be hearing more from Sequent as applications become available for parallel processors; the company will likely be the mid-range leader in parallel processing. Such an architecture, now largely reserved for supercomputers at Sequent, will work its way down to the minicomputer level.

Last fall, a company reorganization shifted the focus for this year to expanding business automation marketing. However, the lack of growth capabilities in its shared main memory may be limiting Sequent's success.

Altos, after several strong years, has recently lost momentum because of a lack of differentiated offerings. While depending in the past on the 80386 processor, it recently branched out to encompass Motorola, Inc.'s newest 68030 processor.

Pyramid and Tolerant, analysts say, need to do something to distinguish themselves and to retain the markets they have each eked out.

Pyramid has big plans for the first part of the year. It is expected to introduce a new generation of systems to compete with low-end mainframes. Currently, Pyramid's largest configuration is in the 30 million-instructions-per-second range. A major difference between Pyramid and other mainframe vendors will be that the Pyramid machines are expected to act primarily as file servers, according to Ed Scott, vice-president of marketing.

Tolerant does not plan to change its strategy; rather, the company expects that the marketplace for Unix-driven, fault-tolerant, on-line transaction processing will be catching up to its product in the near future.

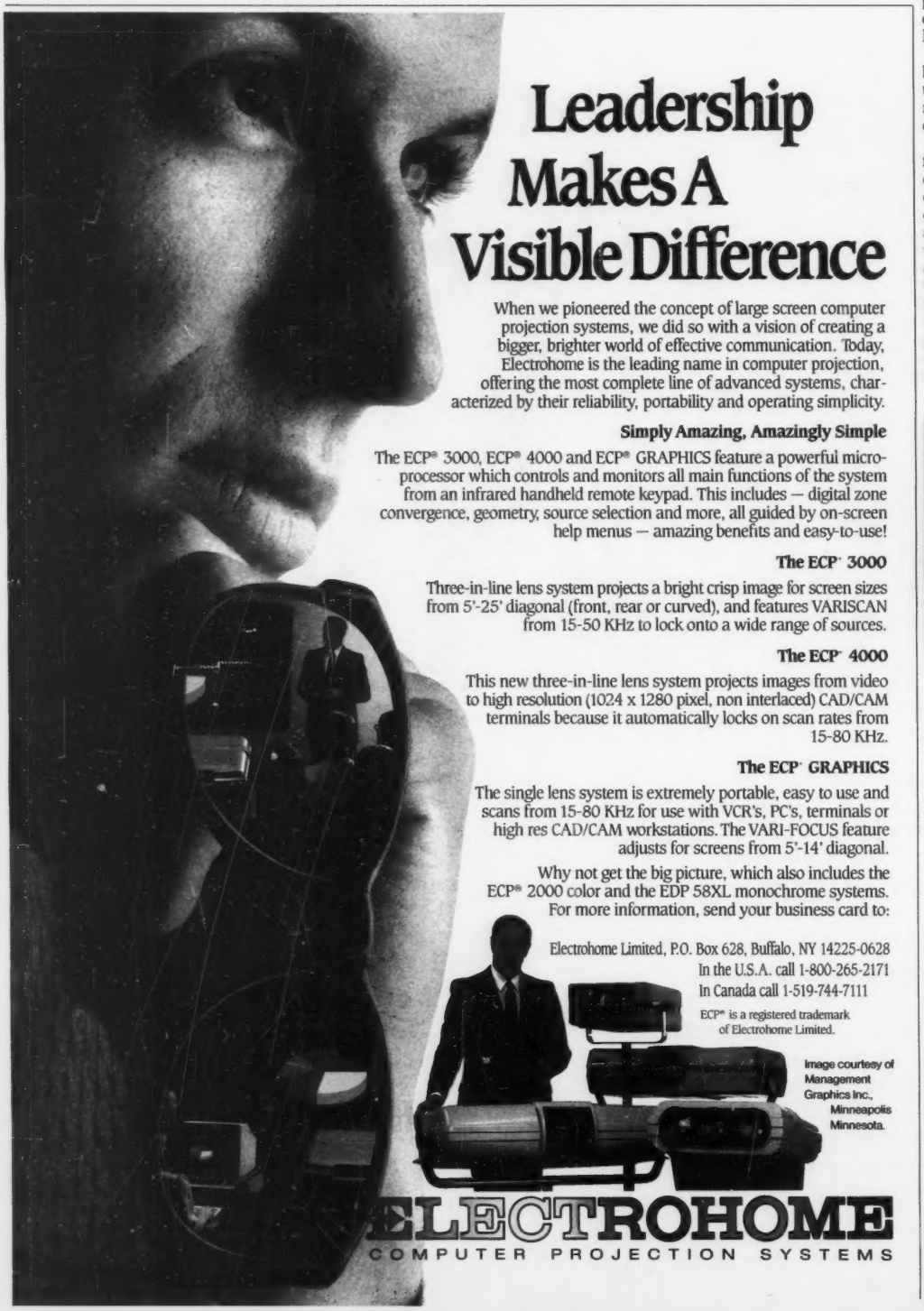
"IT MAKES sense to team up with companies that have all the bugs worked out."

JEANETTE SILL-HOLEMAN
INFOCORP

Another minicomputer maker, Tandem, with its mid-range CLX models, may be one of the few companies that can succeed while maintaining a proprietary operating system.

The Guardian environment is optimized for transaction processing, and its ability to maintain high numbers of transactions per second is causing other firms, such as Digital Equipment Corp., to target Tandem as the transaction yardstick.

Tandem is not planning to incorporate Unix. Instead, the


Leadership Makes A Visible Difference
When we pioneered the concept of large screen computer projection systems, we did so with a vision of creating a bigger, brighter world of effective communication. Today, Electrohome is the leading name in computer projection, offering the most complete line of advanced systems, characterized by their reliability, portability and operating simplicity.
Simply Amazing, Amazingly Simple
The ECP® 3000, ECP® 4000 and ECP® GRAPHICS feature a powerful microprocessor which controls and monitors all main functions of the system from an infrared handheld remote keypad. This includes — digital zone convergence, geometry, source selection and more, all guided by on-screen help menus — amazing benefits and easy-to-use!
The ECP® 3000
Three-in-line lens system projects a bright crisp image for screen sizes from 5'-25' diagonal (front, rear or curved), and features VARISCAN from 15-50 KHz to lock onto a wide range of sources.
The ECP® 4000
This new three-in-line lens system projects images from video to high resolution (1024 x 1280 pixel, non interlaced) CAD/CAM terminals because it automatically locks on scan rates from 15-80 KHz.
The ECP® GRAPHICS
The single lens system is extremely portable, easy to use and scans from 15-80 KHz for use with VCR's, PC's, terminals or high res CAD/CAM workstations. The VARI-FOCUS feature adjusts for screens from 5'-14' diagonal.
Why not get the big picture, which also includes the ECP® 2000 color and the EDP 58XL monochrome systems. For more information, send your business card to:
Electrohome Limited, P.O. Box 628, Buffalo, NY 14225-0628
In the U.S.A. call 1-800-265-2171
In Canada call 1-519-744-7111
ECP® is a registered trademark of Electrohome Limited.
Image courtesy of Management Graphics Inc., Minneapolis Minnesota.
ELECTROHOME
COMPUTER PROJECTION SYSTEMS

company will be working to make the Guardian operating system more open over time, according to Bill Heil, Tandem's distributed systems manager.

"They've done well with their proprietary operating system, but they haven't shut out the corporate environment," says Clare Fleig, an industry analyst at International Technology Group (ITG) in Los Altos, Calif., referring to Tandem. "They're creating interfaces into key communications environments."

ITG's Fleig

All but the largest minicomputer companies will soon appear more like a network than a stand-alone. Horizontally integrated firms will have a marketing edge in the 1990s. Those with the strongest ties to both hardware and software developers and multivendor marketing agreements will be the most successful. Companies with heavy vertical integration that will force them to spend resources on in-house development and distribution will be saddled with narrower profit margins and more risk.

"Companies of all sizes realize they can't survive alone anymore," Infocorp analyst Jeanette Sill-Holeman says. "It makes sense to team up with companies that have all the bugs worked out."

The rocket start-up of Mips is a lesson in horizontal integration, with liaisons to more than 50 companies. Mips markets Unix-based RISC architecture systems, and the market will be seeing a flood of this technology in the next few years, although Mips-based systems are not likely to flaunt the company's logo. DEC has signed on as Mips' biggest distributor, and Mips is looking for another distributor with the impact of DEC.

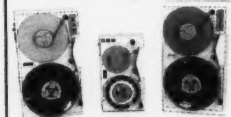
Not only will Mips attempt to expand its entrance into the market with distribution companies, it will also try to save on research and development by buying into new technology. Thus, users may be able to take advantage of lower prices.

While horizontal structuring may get products to market faster than in-house development for today's smaller minicomputer vendors, the resulting problem is in support, according to Carl Flock, an analyst at Dataquest, Inc. in San Jose, Calif. "Some larger companies can put in support immediately," he says. However, smaller organizations may not be able to do so.

Flock says this is a particular problem with networking products that require setup and immediate security support upon purchase. "You can bring in a third party," he points out, "but then who would ultimately be responsible?" •

Savage is a *Computerworld* West Coast correspondent.

Ministreamer™
Desk-Top
9-Track Tape Drives



- A new generation of ½ inch streamers designed specifically for today's desk-top and workstation marketplace.
- Lowest cost 9-Track drives available.
- 1600 thru 6250 BPI formats.
- No rack mounting required. Very light weight.
- Quiet operation, low power.
- Cache memory allows full emulation of start/stop performance.
- Cipher/Pertec, SCSI, and IBM/PC interfaces.
- 7" and 10½" units in stock.
- Private-label and OEM quantities available.

QUALSTAR®

9621 Irondale Avenue
Chatsworth, CA 91311
Telephone: (818) 882-5822

The Right Answer: 3270 Emulation at Half the Price.

MultiCom3270™ Terminal Emulation System for IBM® and compatible Personal Computers

Are you put off by the high cost of 3270 terminal emulators? If so, then Multi-Tech's new MultiCom3270 IRMA®-compatible Terminal Emulation System is the Right Answer for you.

MultiCom**3270** consists of a coaxial 3278/79 terminal emulation card and our **Multi**Com**3270** plus file transfer software, in versions for both PC/XT/AT computers and the IBM Micro Channel Personal System/2. It lets your PC communicate through a cluster controller directly with your IBM mainframe computer.

So why go with our **Multi**Com**3270** instead of "Brand I"? The Right Answer is price. At $699 suggested retail (including both hardware and software), the **Multi**Com**3270** is about half the cost of an IRMA board and software. That's a cost savings that can really add up!

But price isn't the only thing. **Multi**Com**3270** is both IRMA compatible and easy to use. Session operations are handled by simple keystrokes, with pulldown windows and online help information. You also get keyboard record-playback and keyboard lock, which enhance the speed and security of your system.

For a 3270 terminal emulator that delivers the best combination of features and reliability at half the cost, **Multi**Com**3270** is clearly the Right Answer.

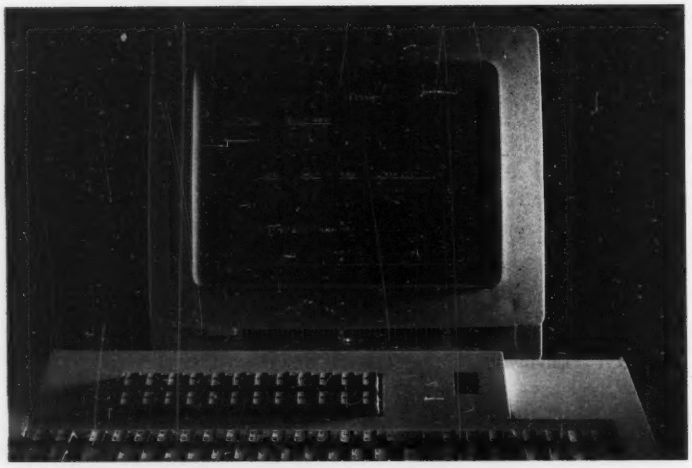
Call us toll-free at 1-800-328-9717 for more Right Answers.

IRMA is a registered trademark of DCA (Digital Communications Associates, Inc.)

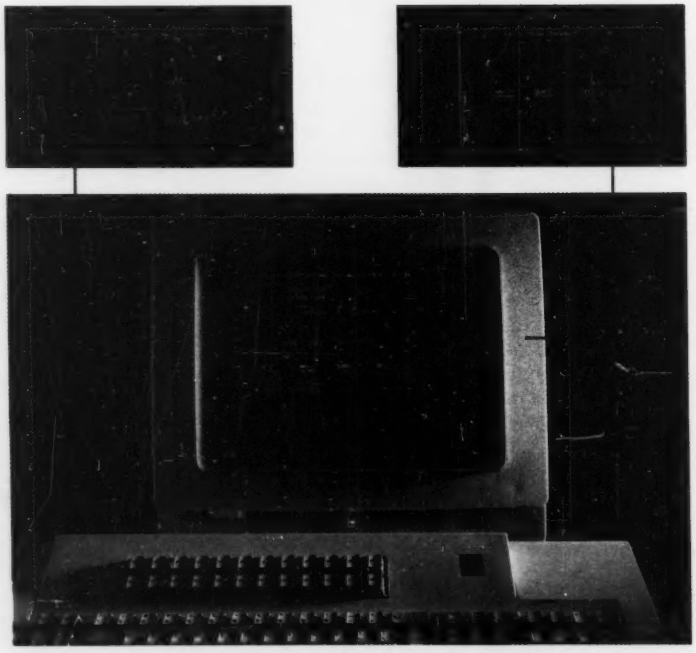
IBM, Micro Channel Personal System/2 are registered trademarks of International Business Machines Corporation.

MultiTech Systems®
The right answer every time.
Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112 U.S.A.
(612) 785-3500 FAX (612) 785-9874
International Telex 4998372 MLTTC

APPLICATION INTEGRATION



Windowing is one way to integrate your applications with TPX.



End users can also benefit from interacting with multiple applications on a single, customized screen.

ONLY TPX MAKES IT THIS EASY

Session managers allow users to switch among applications, but what do users do when they need information from two or more applications at the same time? TPX, the world's leading session manager, now sets a new standard for session management by providing Application Integration—easily.

Many times every day your users need to access and update information from multiple applications concurrently. For instance, a service representative using a Customer Information application under IMS sees a customer's name, address and a summary of accounts. While viewing this data, the service representative needs to access detailed information from the Account History application running under CICS. Think of the increased efficiency and improvement in customer service if information from two or more related applications could be combined on a single, interactive screen.

TPX gives you two ways to integrate applications: windows and customized multi-application screens for end users. With windows, you can divide the terminal screen any way you want and easily interact with any session, as well as jump, scroll, zoom and do cut and paste between sessions. If that's not enough, you can customize your own screens by combining data from any number of applications and give your users a unified, standard view no matter what the existing application screens look like.

Either way, TPX integrates concurrent applications easily, increasing your users' productivity and your business' competitive advantage.

Return the attached reply card today for more information on how TPX 2.0 can help you integrate your applications in an MVS or VM environment. If someone else already returned the card, feel free to call **(800) 323-2600 ext 444** or **(412) 323-2600 ext 444** in PA.

DUQUESNE SYSTEMS
Two Allegheny Center
Pittsburgh, PA 15212

See us at COMMNET-Booth #228

Harry Houdini had one theory anyone could appreciate: If you want to stay out of a bind, you've got to be flexible.

We agree. In fact, that theory is exactly what's behind EXTRA! Connectivity Software.™

For instance, if you're currently linked via coax or modem but you plan to switch to a LAN, EXTRA! gives you the freedom to connect all three ways. And that includes LANs using IBM's Token-Ring Interface Coupler (TIC).

It's flexibility like this that prompted *PC Magazine* to name EXTRA! as its Editor's Choice for PC-to-host software running on LANs.

There's something else we don't want you to forget about EXTRA! It's your memory. EXTRA! uses so little of it, you'll have plenty of RAM left on your PC.

Plus, Attachmate's devotion to total IBM® compatibility assures you that you'll never get dead-ended by proprietary protocols.

Which reminds us of something else Houdini used to say, *"Don't get into anything you can't get out of later."*

PC MAGAZINE EDITORS CHOICE

EXTRA!
3270 CONNECTIVITY
SOFTWARE

Attachmate

1-800-426-6283
In Washington state: 206-644-4010

Attachmate Corporation, Bellevue, Washington, has trademarked EXTRA! Connectivity Software. IBM is a registered trademark of International Business Machines Corporation.

Presenting The Houdini Theory Of Micro-To-Mainframe Connectivity.

MANAGEMENT

TAKING CHARGE

Les Gilliam

Measuring a manager

Every information systems manager is being constantly monitored and measured.

User departments surely are quick to point out deficiencies in products and services and always demand the highest priority on their work. The IS manager's own staff can often be more adversarial than supportive — though probably not openly confrontational. Some IS managers are quite critical of themselves when their performance doesn't measure up to their expectations or that of their peers.

But the one group that the IS manager must be sure to satisfy is senior management. How can the IS manager be sure that senior management is pleased with his performance? Does he just work long hours, doing his best, and hope everything works out? Will he be called in someday to be told his performance has been unsatisfactory and his services are no longer needed?

First, let me suggest that the IS manager go on the offensive in measuring his performance and communicating the results to his superiors. The IS manager must take responsibility for ensuring that his accomplishments are documented and passed on to senior manage-

Continued on page 58

An IS visionary

Dow Jones VP groomed for chairmanship?

BY GLENN RIFKIN
CW STAFF

Everybody who knows him likes to talk about Bill Dunn. Most of those acquainted with his 28-year career at Dow Jones & Co. call him a visionary.

He is also called "outrageous," a "wildman" and "the brightest person I've ever known." In the frenetic, political and conservative world of Dow Jones, the colorful, profane and decidedly uncorporate Dunn is considered to be one of two finalists to succeed Warren Phillips as company chairman.

All this is heady stuff for the former pressman from Des Moines, Iowa, who rose through the ranks on the production side of *The Wall Street Journal* to become executive vice-president in charge of the Information Services Group. Dunn's group, which includes Dow Jones News/Retrieval Service and all of the company's electronic offerings, is the fastest growing part of the company. He is the acknowledged guru who has pulled Dow Jones onto the leading edge of technology.

Salt and pepper

The salty humor and boxer's mug cannot mask Dunn's business acumen and his knack for spotting opportunity. In the nine years since he formed the Information Services Group, Dunn has groomed it to an 835-person, $177 million business unit. If you add $295 million in revenue from Dow Jones' 66% stake in Telerate, Inc., an on-line financial information network whose acquisition Dunn spearheaded, he is responsible for nearly one-third of the company's $1.5 billion in revenue.

The spectacular rise of Information Services has moved Dunn into the elite echelons of Dow Jones. "He has made a tremendous, incalculable contribution to Dow Jones on both the Information Services side as well as on the entire range of the company's activities," Phillips says.

Dunn's lofty status is a long way from his farm-boy days in Iowa. He worked as a night pressman for *The Des Moines Register* before talking his way into Drake University as an economics major.

Born to be a techie

From his start as a production assistant at the *Journal* in 1961, Dunn displayed both an innate technical ability and a smooth touch in personnel issues. In 1969, he was tabbed to be the national production manager. In that role, he helped orchestrate the automation of the paper's production and became visible as a mover and shaker who got things done. He soon took over the engineering and communications departments, and by 1980, he was given charge of the new Information Services Group.

While Dow Jones' watchers and company insiders like to speculate on whether Dunn or *Journal* publisher Peter Kann has the inside track to the top, Dunn — who could be the first executive from outside of the *Journal's* editorial department, as well as the first IS executive to become chairman — refuses to comment. He is philosophical about his future and his life — "Right now, I'm just trying to figure out the 'why' of all this" — and has no desire to get into a political conundrum.

The point may be moot for several years, since Phillips is a young 62-year-old and is not giving a hint about succession.

Dunn, 53, says he is unperturbed by risk, as evidenced by his leap of faith in spending nearly $8 million installing two Thinking Machines Corp. Connection Machines as part of Dow Jones News Retrieval Service — an unproven technology in an untried market.

"Sure, it's a risk, but trying to stay in a leadership position is always risky," Dunn asserts. "We don't care about 'you can always tell the pioneers by the arrows in their back.' That's usually said by people who screw up a lot."

Despite the fact that no one had ever used the massively parallel Connection Machine in a commercial application, Phillips considered it "a reasonable business move." "We have confidence in Bill because his judgments have been correct time and time again in the application of new technology," he says.

Continued on page 59

PROFILE
Bill Dunn

DEAN MICHAELS STUDIO

Position: *Executive vice-president in charge of the Information Services Group, Dow Jones & Co.*

Mission: *Synthesizing issues and cutting through the complicated elements to bring out what is really important*

Changing the profile requirements

BY ALAN J. RYAN
CW STAFF

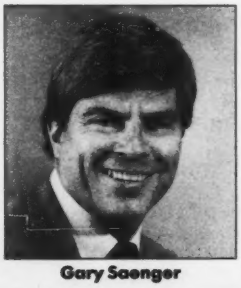
The coming year will bring the continuing information systems headaches of weeding out nonapplicable technologies and getting mainframe junkies to look at personal computers and other platforms. But in the years to come, IS departments will also be looking carefully at the kinds of people they hire.

With IS becoming less and less the backroom operation it was several years ago, companies need to hire more workers who have technical and people skills, according to human resources personnel in large companies.

"As you get cost-conscious, you continue to expect more from every person you bring in," said Gary L. Saenger, senior vice-president at Security Pacific Automation Co. in Los Angeles.

"You're hiring two or three levels from that entry-level position" for any job that has a potential supervisory or managerial growth path, he said.

Companies no longer feel that those hired for the IS department must come from a solid computer science background. With the continuing emergence



Gary Saenger

of end-user computing, the traditional IS employee profile as one with a high need to achieve but a low need for social interaction has to change, said Robert Zawacki, president of Colorado Springs-based consulting firm Zawacki and Associates.

Potential employees "have been beating on PCs for years. We don't have to teach the college graduates we see today what an information system is," said Jim Valenteen, senior vice-president of human resources at Cigna Systems in Philadelphia.

Blur in the future

"The technology and business person will blur in the future," Valenteen said, as it becomes increasingly critical for the IS workers to fully understand the business. "They will have to understand why they do things, not to just keep doing them." Za-

Robert Zawacki

wacki said many companies are offering programs to teach existing IS employees how to im-

Continued on page 60

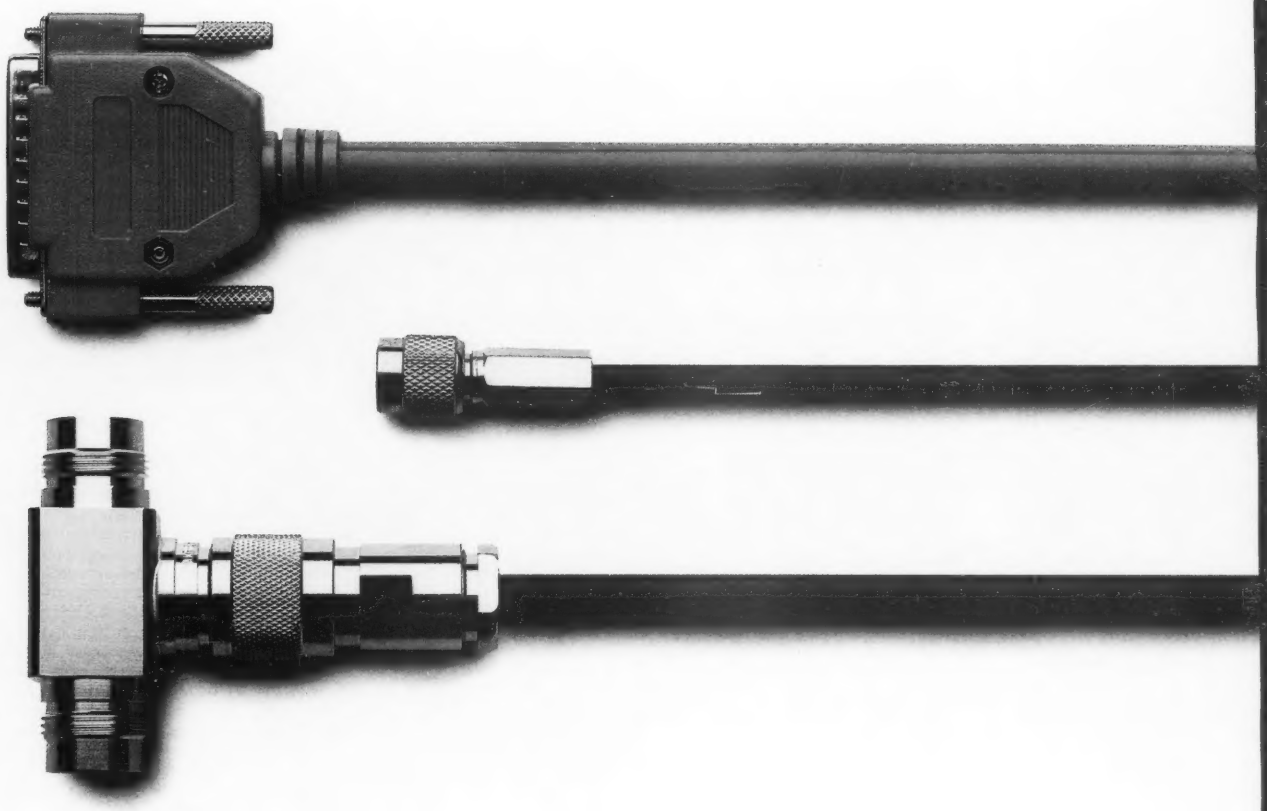
The printers used by more people can now be used in more places.

Now you can connect the world's best-selling, best-performing dot matrix printers to your mini, mainframe *and* personal computers.

The connection works this way. An Epson-approved interface board easily installs into an Epson® printer, making it fully compatible with your Systems/3X, AS/400™ or 3270 environment. It's that easy.

The hardest part is deciding which Epson to use. There's the LQ Series—the number one line of letter quality printers in America. Or Epson's legendary FX printers, famous for their unrelenting reliability. Finally, there's the Epson DFX-5000. With a print speed

*EP-Connect coax adapter available from Avatar Corporation, (508) 435-6872. Twinax adapter, the I-O 8300, manufactured by I-O Corporation, (801) 973-6767. AS/400 is a trademark of International Business Machines Corporation.



of 533 CPS, this high-volume workhorse is a smart, economical alternative to costly line printers.

In short, when you hook up Epson printers, your users get greater selection, better paper handling and outstanding performance. Your company gets a tremendous value. And you get all the credit.

Of course, by now you've probably made that connection.

EPSON

WHEN YOU'VE GOT AN EPSON, YOU'VE GOT A LOT OF COMPANY.™

Epson is a registered trademark of Seiko Epson Corporation. Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505. **(800) 922-8911.**

Gilliam

CONTINUED FROM PAGE 55

ment. The IS manager who doesn't take the initiative in this matter allows others to make important decisions about his career without making sure that they have all the facts.

Second, a set of measurements should be established to gauge the performance of the manager and staff on a regular basis. These measurements might include analytical data such as budget comparisons as well as opinion surveys of users. Of paramount importance is to measure the range of responsibilities for which the IS manager is accountable.

Discussed below are several useful measurements. Not every idea is applicable in every company: Some are more useful in a larger environment, while others may be right on target in a smaller organization.

Most IS managers are expected to prepare a set of annual work plans that describe the expected accomplishments for the coming year. The manager should use these plans as a road map for the year's activities and to monitor and report the progress of the organization in completing planned projects and activities.

Senior management likes to have an IS manager who thinks about the bottom line — how the computer and telecommunications organization can contribute directly to the profitability of the company. The manager should not only look for and capitalize on such opportunities but should be sure his superiors are fully informed of such accomplishments.

Next, the manager must exert strong financial control over the company's expenditures for information technology. Just being under budget is not acceptable. If the budget was too large to begin with, being under budget does not reflect sound fiscal management. Preparing well-planned and justifiable budgets is the first step. Then, controlling expenses will point to good management practices.

How can user satisfaction be measured? It sometimes seems that users will never be satisfied until all their requests are filled immediately and free of charge. In some companies, measuring user satisfaction can be done with an annual questionnaire if it is well-designed to elicit accurate responses. But in some cases, the manager will need more formal methods to measure service to all users.

One such formal measure is a service-level agreement. With such an agreement, the IS organization agrees to provide a certain service quantity and quality, and the user agrees to buy that service for an established price. These agreements may include such things as response time goals, system availability and batch processing schedules. Thereafter, the various types of services involved should be measured and compared with the original agreements to reflect the service provided, not just the users' memory.

Most top managers are concerned with the future of the company, and one key area of concern is how the company is training and developing its employees to assume greater responsibilities. In management terms, this is often called the plan of succession. The IS manager will do well to develop such a plan and outline the training or development assignments needed to assure that the organization's future will not be endangered by the lack of qualified personnel to fill key positions. This measure may also be meaningful to top management in determining how well IS management is doing in recruiting and keeping good people.

Bean-counting

Attempting to measure the productivity of computer people has been a subject of much talk for many years. Only recently has there been real breakthroughs in developing practical and applicable methods for such measurements. One method is the use of function points to gauge an application. If the size and complexity of an application can be measured, then perhaps its development, processing and support services can be measured.

Quite often, top management becomes concerned that its organization is not taking advantage of technological developments. If the IS manager is forward-thinking and applying innovations to better the company's progress, such information should be documented and communicated upward.

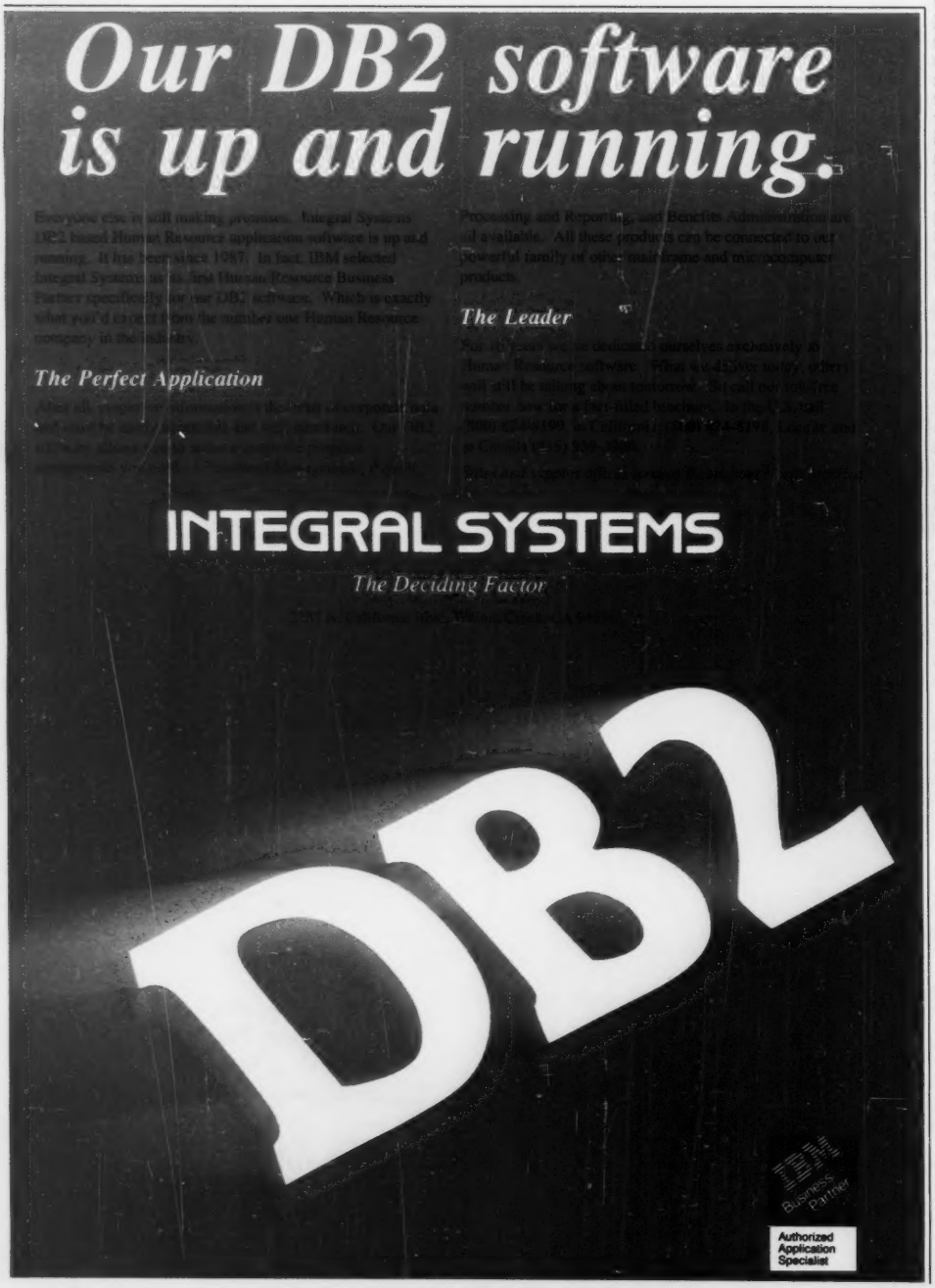
One measure that may be of great significance to senior management is how well its computer and telecommunications operation compares with other companies. If such information can be gathered, it could tell top management many things, such as whether the IS function is well-managed or under-funded.

For these measurements to be fully effective, they should be communicated to senior management, users and staff. This can be done through progress reports, user meetings, project review sessions or a steering committee.

But the final — and maybe the most important — factor in the process is feedback from senior management. The IS manager must use whatever initiative is necessary to determine where he stands with his boss. This can be done informally, by asking for advice on how to improve his performance, or in more formal counseling sessions.

Success will come to the IS manager when he can make his own priorities, match those of senior management and carry them out in a satisfactory manner.

Gilliam is president of Gilliam Associates, a computer management consulting firm based in Ponca City, Okla.



Visionary

FROM PAGE 55

Dunn himself is a self-proclaimed nontechnologist — "I don't really like to screw around with computers." But the technically competent around him say he quickly grasps concepts and understands the value of a new technology.

"He sees opportunities others don't see," says Charles Brady Jr., director of systems development in the Information Services Group. "He has a good knack for the 'Why not?' "

"Once you get your shock absorbers in place, he's amazing," adds Tim Browne at MIT's Media Lab. "He understands things so quickly and is able to cut through the crap and get right to work."

Speaking the language

Dunn explains that in his role as national production manager at the *Journal*, he was forced to understand the technical issues and lingo of the printers and typesetters.

"I always felt it was unfair not to understand the issues of the departments reporting to you," he says. And so it was the same when he formed the Information Services Group in 1980 and brought the technology and information systems people into his fold.

Dunn views his role as the synthesizer of issues — cutting through the complicated elements to bring out what is really important.

Dow Jones pioneered in the areas of microwave transmission, satellite transmission, innovative pagination techniques and a myriad of production and delivery breakthroughs that helped enhance the *Journal's* position as the nation's most powerful business newspaper.

Dow futures

Dow Jones News/Retrieval, the jewel of the Information Services Group, is the dominant U.S. financial on-line database service, with nearly 300,000 subscribers. To Dunn, the electronic distribution of information represents the future of Dow Jones.

"I wouldn't spend any minute of my life doing anything if it wasn't driven by the fact that the electronic vehicle will far surpass the *Journal* in its best years, absolutely knock it dead," Dunn states.

He espouses the delivery of "content" in a multitude of forms. "Most people in the media think of the information content," says Ken Noble, first vice-president at Paine Webber, Inc. and a long-time Dow Jones watcher. "Dunn has always thought about delivery of that content. And he thinks it pays to be first. It may not always be a success, but if it is, he'll be first."

In fact, many of Dunn's firsts were less than successful. Forays into cable television, retail software and an innovative but flawed product called Dowalert all fell short of expectations. Several million dollars were lost. "The culture allowed the survival of the individuals, and it didn't chill the creative spirit. We try to demonstrate that in an open environment, if you've screwed up, it's just a screwup," Dunn says.

"This is a guy who has learned to intelligently fail, so that when you come back the next time, you clean up," says Michael Schrage, a visiting fellow at MIT's Media Lab and a former Dow Jones Information Services staffer. "He knows how to gamble and lose and then come back and take everyone else's chips."

Just as Dow Jones is at a crossroad, finding the corporate balance between the powerful *Journal* and the fast-growing electronic delivery of information, Dunn is also evaluating his future. From deferred bonuses, he has accrued enough wealth to retire today "and wander in the desert near Santa Fe in a white robe."

But the mercurial Dunn is unlikely to let on to anyone what his plans are. Instead, he seeks and devours information that will facilitate the company's mission.

"We don't create things in Dow Jones; we really synthesize what is out there," Dunn says. "We didn't invent satellite technology; we adopted it. So what do we adopt now? How does it fit into the continuum? We're *here* — how do we get *there*?"

No other application development software is quite this fast.

Sure, you expect speed. But not this much speed. Truth is, anyone who has ever developed applications is surprised by PROGRESS. Like the developers who gave it the highest satisfaction rating among the 4GL DBMSs surveyed by DATAPRO.*

PROGRESS is a high-performance 4GL designed specifically for building, modifying, and customizing database applications. It requires less code than other 4GLs, it's crash-proof, has SQL, and it's transparently portable across UNIX, XENIX, ULTRIX, AIX, MS-DOS, VAX/VMS, and CTOS/BTOS, as well as LANs.

Well, hold your horses.

NOW PROGRESS APPLICATION DEVELOPMENT IS EVEN FASTER WITH PROGRESS FAST TRACK.*

PROGRESS FAST TRACK is a menu-driven application builder that allows developers and users to paint screens, create menus, generate reports and perform queries. Unlike other application builders, PROGRESS FAST TRACK provides you greater flexibility and control by generating 4GL code.

For only $95†, you can test drive a copy of PROGRESS. And if it's not as fast as we say it is, we'll refund your money. So call today.

And hang on tight.

Send $95† for your PROGRESS Test Drive.
Or call: Progress Software Corporation
5 Oak Park
Bedford, MA 01730
1-800-FAST 4GL
(In Massachusetts, call 617-275-4500)
FAX: 617-275-4595
Telex: 509965
(In Canada, call 416-620-6766)

PROGRESS
FASTEST FROM START TO FINISH.

Offices in: Atlanta, Boston, New York, San Diego, Washington, D.C., Amsterdam, Brussels, Cologne, Copenhagen, Helsinki, London, Melbourne, Montreal, Munich, Oslo, Paris, Reykjavik, Stockholm, Sydney, Toronto, Vienna, and Zurich.

*DATAPRO Reports on Software, DATAPRO 70 © 1986, 1987, DATAPRO RESEARCH CORPORATION †For international orders please call for shipping and handling information.

PROGRESS and PROGRESS FAST TRACK are registered trademarks of Progress Software Corporation, developers of advanced software technology for business and industry. The following are trademarks of the following companies: VAX, VMS and ULTRIX of Digital Equipment Corporation; UNIX of AT&T; MS-DOS and XENIX of Microsoft Corp.; CTOS of Convergent Technologies, Inc.; BTOS of Unisys Corporation.

Anticipating the waves of the future

Human resources personnel dedicated to IS say changes taking place within the information systems arena will stir many issues during the next several years, including these:

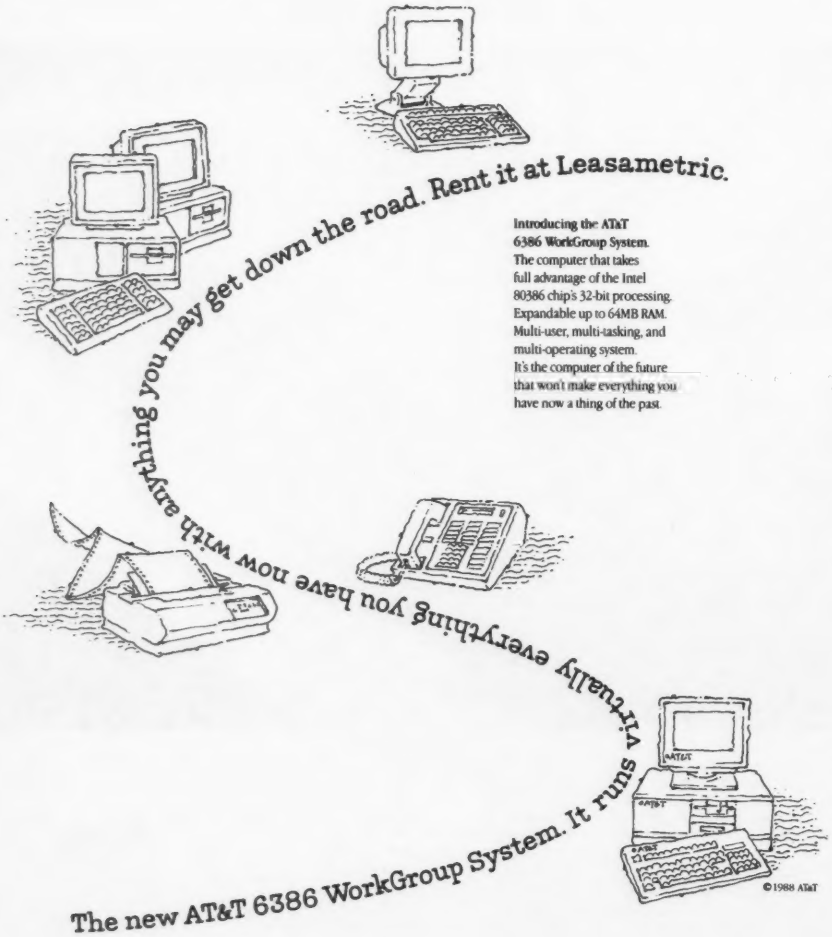
- Redeploying old skills in technology into some of the evolving hardware and software technology.
- Expert systems, image-based systems and other types of automation as competitive tools.
- Exploring the possibility of downsizing.
- Better communications between IS and the users, as well as increased communications within IS.
- Getting more done while keeping expenses flat.
- Merging telecommunications and computer technologies.
- Integrating discrete IS shops following mergers.
- Keeping the IS customers happy as more and more companies give departments a choice on whether to purchase service from IS or an outside source.

The IS worker will become more demanding, the human resources personnel said. Workers are expected to be less inclined to be mobile in their jobs and will expect the following:

- More flexible schedules.
- Telecommuting.
- Employers who have made a commitment to training and to remaining state of the art.

A trend to watch during the next several years will be companies creating data processing operations remote from their central headquarters in order to locate the IS shops in which the top professionals can be found.

ALAN J. RYAN


anything you may get down the road. Rent it at Leasametric.
Introducing the AT&T 6386 WorkGroup System.
The computer that takes full advantage of the Intel 80386 chip's 32-bit processing.
Expandable up to 64MB RAM.
Multi-user, multi-tasking, and multi-operating system.
It's the computer of the future that won't make everything you have now a thing of the past.
virtually everything you have now with anything. It runs
The new AT&T 6386 WorkGroup System. It runs
©1988 AT&T

For more information on renting, leasing and buying PCs, peripherals and network products, call the nearest Leasametric office.
We'll show you all the advantages we offer, including the most professional service and maintenance in the industry.

Northwest: (800) 343-7368, (415) 574-5797 - Southwest: (800) 638-7854, (818) 708-2669 - Central: (800) 323-4823, (312) 595-2700
Northeast: (800) 221-0246, (201) 825-9000 - Southeast: (800) 241-5841, (404) 925-7980

LEASAMETRIC
Data Communications

AT&T
The right choice.

Changing

CONTINUED FROM PAGE 55

prove their interaction and workplace social skills as the emphasis on end-user computing escalates.

Emmet McTeague, an assistant vice-president at Aetna in Hartford, Conn., who handles human resources within the IS department, concurs. "An awful lot of DP people have still been consumed by back office operations and have felt some security in that. Now users are driving changes in the way systems are looked at, and it is hard for systems to keep up," McTeague said. "Systems people have gone from being the definitive change agents in the company to being change targets."

Valenteen

Because of the changes caused by end-user computing, the IS department will be forced to become more service-oriented and market-driven, said Bob Klepper, an assistant professor in the MIS department at Southern Illinois University in Edwardsville.

"A lot of the application development is moving to end-user areas, and the MIS department in a sense has had to compete," Klepper said.

CALENDAR

FEB. 5-11

Developing and Using the Information Systems Architecture. Tempe, Ariz., Feb. 6-7 — Contact: The Dooley Group, Suite 109, 50 9th Ave. South, Hopkins, Minn. 55343.

Communication Networks '89. Washington, D.C., Feb. 6-8 — Contact: International Data Group, Conference Management Group, P.O. Box 9171, 20 Speen St., Framingham, Mass. 01701.

Annual Systems Conference, Co-sponsored by the Healthcare Information and Management Systems Society of the American Hospital Association and the Society for Health Systems of the Institute of Industrial Engineers. Anaheim, Calif., Feb. 6-9 — Contact: American Hospital Association, 840 N. Lake Shore Drive, Chicago, Ill. 60611.

Buscon/89-West. Santa Clara, Calif., Feb. 6-9 — Contact: Buscon/89-West, CMC, 200 Connecticut Ave., Norwalk, Conn. 06856.

Audiotext Conference and Exposition. Las Vegas, Feb. 7-8 — Contact: Infotext Magazine, P.O. Box 19740-155, Irvine, Calif. 92714.

Dexpo East. New York, Feb. 8-10 — Contact: Expoconsul International, 3 Independence Way, Princeton, N.J. 08540.

FEB. 12-18

ABA 1989 Bank Telecommunications Conference (TELCOM '89). New Orleans, Feb. 12-15 — Contact: American Bankers Association, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

Development Center Institute Conference. Orlando, Fla., Feb. 12-15 — Contact: Development Center Institute, P.O. Box 44087, Indianapolis, Ind. 46244.

Electronic Printing Systems/Professional Electronic Publishing Conference. Orlando, Fla., Feb. 12-16 — Contact: Electronic Printing Systems, Suite 1, E. Vista Way, Vista, Calif. 92084.

"Last Frontier" Conference on Computer Software Copyright Issues. Tempe, Ariz., Feb. 13-14 — Contact: Rosalind Pearlman, Center for the Study of Law, Science and Technology, College of Law, Arizona State University, Tempe, Ariz. 85287.

INDUSTRY INSIGHT

Clinton Wilder

Parting thoughts

Vendors' quarterly losses or earnings declines, resulting from product-line transitions, memory chip prices and hostile takeover defense costs, have dominated the industry's financial headlines of late. But Sequent Computer was a diamond in the rough, pumping out about 100% yearly growth in both sales and profits — and creating a little nostalgia for me.

This week, I shift gears at *Computerworld* after three years of editing this section and nearly four years covering the computer industry. I have taken over our Management section and will spearhead our coverage of IS strategies, management issues and executive changes within user organizations.

When I began following this industry in early 1985, financial reports like Sequent Computer's wouldn't have batted an eyelash. At that time, high-tech was virtually synonymous with high growth. Everything from the Inc. 500 to Massachusetts' Rt. 128 was replete with entrepreneurs successfully working 25 hours a day on the latest personal computer widget or software tweak. A couple of years later, they were all going public and investors in the roaring bull market eagerly gobbled them up.

Tricky business

But time would soon show that computers are a tricky business — not unlike so many other industries. Today, no one, not even Compaq's Rod Canion or Sun Microsystems' Scott McNealy, should forget the first law of business: Nothing lasts forever.

The pattern that has recurred time and time again in various industry segments is well exemplified by the mini-supercomputer. At first, there was a perfect marriage of new technology and market need. Convex Computer and Alliant Computer Systems began to prosper, and suddenly minisuper companies, seeded by

Continued on page 63

Customer-pleasers earn shiny quarters

BY NELL MARGOLIS
CW STAFF

***The customer is always right.* — Common marketing cliche**

Computer companies reminded us last week that time-honored marketing cliches got to be that way for a reason. Fourth-quarter earnings reports continued to track the rewards of new products delivered on time in working order to customers whose demand preceded the supply.

Marlboro, Mass.-based Stratus Computer, Inc. rode the magic formula to its 24th consecutive quarter of profits. Its 1988 revenue increased 44% to $265.3 million; net earnings jumped 51% to $29.3 million.

"Stratus has a lot of advantages," said John B. Jones Jr., an analyst at Montgomery Securities. "They're in a hot market with very capable products that are price-competitive and out on time, and [they have] a great relationship with a very good OEM named IBM."

Stratus Chief Financial Officer Gary Haroian said the quarter and year reflect recent significant investment in the company's direct sales force, particularly on the domestic front. This in part accounts for Stratus being one of the few computer companies to tout burgeoning U.S. business this past quarter.

Waning giant?

Customers warming to the recently released Y-MP/832 helped fuel supercomputer maker Cray Research, Inc. to powerful fourth-quarter gains, which in turn helped edge the company into 10% earnings growth and 6% profit growth for the year. While this overall growth rate was Cray's slowest in years, Michael Geran, an analyst at Nikko Securities Co., cautioned against hasty conclusions that the giant is waning.

"Cray is confronted with accelerating technology, a changing customer profile and a much bigger company" as hurdles to high percentage growth, Geran said.

He noted that heavy research and development investments, even if they bog down earnings, should be applauded, not bemoaned. With Cray anticipating strong competition from DEC and IBM, he said, "creative destruction is essential for long-term growth."

Unisys Corp. reported a weak fourth quarter, drained by the customer-freezing effects of the company's transition from its 1100 series mainframe line to the new 2200s.

Unisys also posted an approximately $20 million charge to cover the anticipated costs of its current reorganization and the integration of recent acquiree Convergent, Inc. The Blue Bell, Pa.-based organization also warned of continued weakness in the early part of 1989.

"The Unisys story could be *A Tale of Two Cities* this year, as

Continued on page 62

1988 fourth-quarter earnings

No surprises — predictions of profit-and-loss prophets come true

	Revenue October through December (in millions)	Percent change from 1987	Net income October through December (in millions)	Percent change from 1987
Altos	$40.4	(14%)[1]	($1.8)[2]	—
Apollo	$184.1	13%	$3.2	(68%)
Ask Computer Systems	$45.5	41%	$3.2	41%
AST Research	$110.9	20%	($8.9)	—
Cray Research	$330.9	102%	$88.5	160%
Data General	$308.6	(10%)	($19.5)	—
Harris	$555.2	13%	$25.2	11%
Lotus	$112.4	(3%)	$8.9	(60%)
Northern Telecom	$1.5B	17%	($22.6)	—
Prime	$431.1	61%	($14.4)[3]	—
Relational Technology	$29.2	56%	$2.1	25%
Sequent	$24.2	100%	$2.2[4]	100%
Stratus	$79.4	44%	$9.2	41%
Teradata	$34.5	77%	$3.8[5]	29%
Unisys	$2.9B	3%	$218	1%

[1] Parentheses indicate decrease or loss
[2] Last year's second fiscal quarter included net gain of $3.1M from sale of portion of company's investment in Informix
[3] Includes nonrecurring charge for costs of reorganization
[4] Includes extraordinary tax credit from net operating loss carryforwards of $328,000
[5] Includes extraordinary item: reduction of income taxes because of net operating loss carryforward

CW CHART: FRANK C. O'CONNELL

Prime workers join battle

BY NELL MARGOLIS
CW STAFF

NATICK, Mass. — A group of Prime Computer, Inc. employees calling themselves Employees Against the Takeover (EAT) mounted an effort last week to dissuade Prime's stockholders from tendering their shares to MAI Basic Four, Inc.

EAT's message is simple, said industrial designer Daniel Jones, 38, who helped spearhead the group: "Don't sell to MAI. For those who have already tendered shares — withdraw."

The employees' message came none too early in the game. As of Jan. 19, Tustin, Calif.-based MAI claimed to have approximately 71% of Prime's outstanding shares sewn up. That puts the hostile would-be acquisitor within striking distance of the 85% minimum mandated by Delaware law to take control of the company.

The message's urgency, Jones said, is fired by the group's conviction that MAI's bid, if successful, will create a heavily leveraged, research and development-starved entity that will be parceled up and sold off as expediently as possible. A number of analysts have speculated on a similar scenario.

Eating bingo

So far, EAT has amassed between 750 and 1,000 Prime employee signatures on a statement of solidarity and support to be presented to Chief Executive Officer Anthony L. Craig.

In addition, the group is building a war chest of employee contributions to publicize the employees' commitment to their company, Jones said.

The employee initiative, he noted, has not yet had a measurable effect outside the company. Within the besieged firm, however, "There's already been a remarkable change," Jones said.

According to Jones, morale "had dropped to shocking levels. Now we've seen an increase not only in activity but in productivity."

Canadian vendors hail U.S. trade agreement

BY PAUL BARKER
IDG NEWS SERVICE

TORONTO — The U.S.-Canada free trade agreement, which was approved late last month by the Canadian Senate, has been roundly endorsed by Canadian computer vendors and software developers.

Senior Canadian executives of corporations ranging from Amdahl Corp. to Microsoft Corp. predicted agreement-generated breakthroughs in U.S. market penetration, cost-savings to the end user and even a chipping away of inferiority complexes.

"From a personal perspective, it's going to have a tremendous positive effect for Canadian developers," said Malcolm MacTaggart, general manager of Microsoft Canada. "As a country, we have had this insecurity complex. The talent here is as good as anywhere in the world, and to be insecure about that is wrong."

David Raye, president of Apple Computer, Inc.'s Canadian group, said he sees free trade as the right thing for the country.

"With Bush elected in the U.S. and the PCs in government, I'm certainly optimistic. Business in general realizes that unless there is an opening up of the market and reduction of subsidies, the economy is not going to grow," Raye said.

One major change

Under terms of the bilateral agreement, the only major change affecting the sale of vendor equipment is a lifting of a 3.9% tariff by the Canadian government within the next 12 months. Depending on the product, that reduction could mean sizable savings for Canadian end users.

Continued on page 63

IN BRIEF

Cauterization

Sunnyvale, Calif.-based **Televideo Systems, Inc.** is taking steps to stanch the flow of red ink that will continue to color its earnings report for the fiscal quarter ending this week. New President Dallas Talley announced a work force reduction last week that will pare the employee roster by some 60 manufacturing and headquarters staff jobs.

Rent-a-byte

The new division's name says it all: **Businessland Rents.** Billion-dollar microcomputer reseller **Businessland, Inc.** announced its entry into the micro rental arena last week — a business niche estimated at $200 million and growing.

Daisy chain

A companywide reorganization aimed at consolidating Mountain View, Calif.-based **Daisy Systems Corp.**, its hard-won recent acquiree **Cadnetix Corp.** and Cadnetix's own recent acquiree **Simucad Corp.** will keep all five of the companies' operations and engineering sites fully operational, according to Daisy Chief Executive Officer Norman Friedmann. Under the new structure, Friedmann will head corporate development, finance, human resources, sales and customer support. In charge of software and hardware engineering, analog products, marketing, manufacturing and program management will be former Cadnetix CEO and current Daisy President and Chief Operating Officer Bruce Holland.

Stock marketing

Hewlett-Packard Co. has applied to list its stock on four European stock exchanges, the company announced earlier this month. If the applications are approved, HP stock — currently traded on the New York and Tokyo exchanges — will be listed as of the fourth week of April in London, Frankfurt, Paris and Zurich.

On-line modeling

Alliant Computer Systems Corp.'s recently acquired subsidiary **Raster Technologies, Inc.** and **Bechtel Software, Inc.**, owned by construction engineering giant **Bechtel Group, Inc.**, joined forces last week to give users a plastic model alternative. Under a joint development pact, Bechtel will port a three-dimensional animation software package to Raster's GX4000 graphics accelerator built into a workstation from Sun Microsystems, Inc. The result will let architects, designers and engineers replace traditional plastic modeling with an interactive, real-time on-screen alternative, the firms said.

Shiny quarters

CONTINUED FROM PAGE 61

customers wait for the new mainframes, with the worst of times coming in the first two quarters and the best of times in the second half," Geran said. "They're going to have to walk through the valley before they get to the peak. Transitions are bloody."

More transition woes

Few at Westboro, Mass.-based Data General Corp. would disagree. With revenue slipping and profits among the missing in the December quarter, the company tagged its performance to the repercussions of a major transition in high-end systems. Drexel Burnham Lambert, Inc. analyst Peter Labe said, "The explanation is simple: The MV/40000 was where all the orders were, and they couldn't ship enough of them. The MV/20000 was what they could ship, and nobody was ordering."

In a prepared statement, Executive Vice-President Ronald Skates said that DG is plowing revenue from its proprietary systems into industry-standard technology without which, according to numerous analysts, the company's prospects will be bleak. Skates also confirmed that DG's vaunted Motorola, Inc. 88000-based computer line is still on target for a spring debut.

The Motorola line "is the future for them, but they can't expect much revenue from it over the next two years," Labe said. Meanwhile, workstation pioneer Apollo Computer, Inc. broke back into the black after a two-quarter absence.

Lotus Development Corp. ran afoul of the on-time factor in 1988 and was still paying the penalty in the fourth quarter for the notorious delays in Release 3.0 of its 1-2-3 spreadsheet classic, according to Bob Therrien, an analyst at Paine Webber, Inc. On the other hand, Therrien pointed out, there is viability — if not actual growth — in giving the customers what they still want. "You hear so much about how sales of Lotus' 1-2-3 are drying up, but the fact is that they aren't," he noted. "Sales of a standard don't go away."

Why spend money on computers when you can make money on computers?

UN

Wilder

CONTINUED FROM PAGE 61

venture capital or by the likes of Prime, sprouted everywhere.

Like minicomputer and PC makers before them, the minisuper vendors found out that demand was not infinite, and there was not enough room for everyone. Enter the four horsemen of the industry apocalypse: losses, layoffs, shakeout and consolidation.

The lesson is, beware of the hot new technology; you will see the same pattern all over again. Being first to market is a decided advantage at first, but in the long term, the race is not to the swiftest but to the company most willing to adapt to a changing environment.

If there is one statement that everyone would agree on, it is this: Change is very rapid in this industry. So, why do so many companies fail to react to — let alone anticipate — fundamental changes, such as the artificial intelligence market's move to industry-standard hardware platforms that blindsided Symbolics?

At many firms, such as Cullinet, the realization of change is a long and painful one. But Cullinet should be commended for eventually hammering out a strategy for survival — and maybe prosperity — in its new world.

The best firms make their moves *before* the losses and management upheavals force their hand. That is why it has been so painful to watch Prime being attacked by MAI Basic Four. More than any of its counterparts in size and market, Prime saw that the days of the general-purpose minicomputer were numbered and decided, with some controversial moves, to play its cards in computer-aided design and manufacturing.

Prime's reward for farsighted and innovative strategy has been the ugliest hostile takeover bid since Asher Edelman went after Datapoint, a company not nearly as well-positioned for long-term growth as Prime.

What kind of signal does this send to the industry? If MAI's Bennett LeBow succeeds, will the U.S.' most innovative technology companies fall into a short-sighted circle-the-wagons mentality to protect themselves from takeovers? If that occurs, each company may succeed in saving itself, but there may be only one real winner — the Japanese competition.

Having said that, I hate to leave my coverage of the industry on such a somber note. No matter what the future holds, the computer industry will continue to be filled with bright, fascinating people who, along with their companies, have been both a challenge and a pleasure to write about.

One of the least savory aspects of this job, however, is dealing with the same scourge that confronts MIS executives every day: vendor marketing hype. My journalism colleagues and I have railed against it often in print, and I won't do so again.

But I will leave the image of one imaginary vendor as a symbol of what the industry needs less of — and I hope that all computer industry players can look at themselves and agree:

"Recognized as the world's leading technology supplier in its field, Vaporex Technologies Corp. conceives, designs, develops, manufactures, tests, debugs, markets, distributes, services, begs, borrows and steals a full line of real-time, high-performance, integrated, state-of-the-art industry standard business computing solutions to sophisticated corporate Fortune 2,000 MIS customers worldwide.

Employing over 200 people, the company's products are sold by a direct sales force and by OEM, VARs, VAD and ISV partners through Vaporex's 'I'll scratch your back if you'll scratch mine' cooperative marketing program."

Wilder assumes the position of senior editor, management, this week.

TODAY, NO ONE, not even Compaq's Rod Canion or Sun Microsystems' Scott McNealy, should forget the first law of business: Nothing lasts forever.

Most CEO's and senior managers look at computer operations as cost centers, not profit centers.

Unisys has helped many businesses use information to be more competitive. We've done it for banks. We've done it for airlines. We can do it for you.

Unlike most computer companies who focus on partial "solutions" to short-term, isolated problems, Unisys focuses on creating applications and hardware that can grow your business over the long haul.

We aren't just an industry leader in networking. We aren't just the maker of the broadest line of compatible computers. And we're not just the creator of the most flexible software tools available. We are all these things.

And we have the expertise to tie it together so you can turn your information generator into a cash generator. Work with us and we'll prove it.

UNISYS AND YOU.
The power of ²

iSYS

Canadian

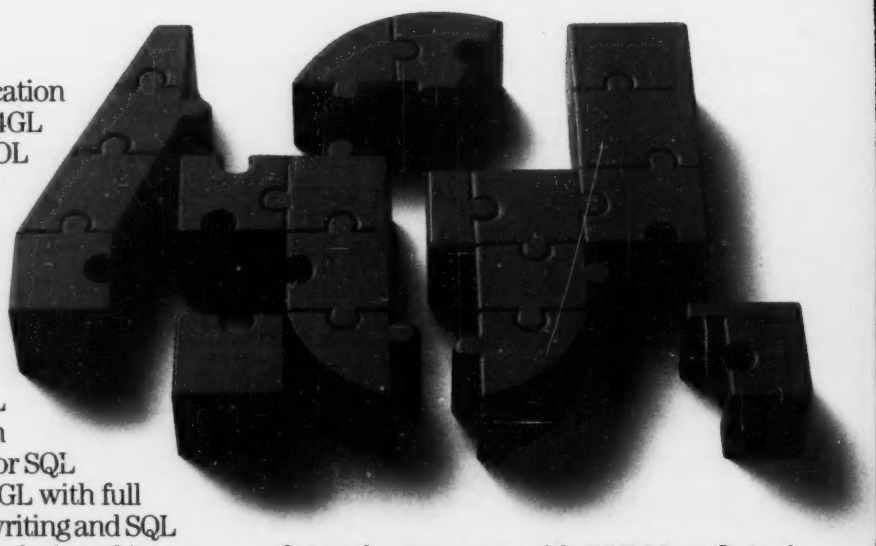
CONTINUED FROM PAGE 61

Amdahl, for example, expects cost reductions of $83,000 ($100,000 Canadian) for its 5890 mainframe and more than $166,000 ($200,000 Canadian) for the company's high-end 5990.

"The Canada-U.S. agreement represents more of a ripple than a wave for both our country and Northern Telecom," said Robert Ferchat, president of the company's Canadian division. "It is a discontinuity to be sure but not a threat. In fact, it is an opportunity for all."

Don Woodley, president of Compaq Computer Corp.'s Canadian subsidiary, said the agreement creates an opportunity for small Canadian companies to do business in the U.S. and bring talent to the forefront. Jim Leto, his counterpart at AT&T in Canada, said free trade allows the multinational to look at Canada as a risk-free environment.

Informix is the #1 c
And the only c



To develop your application faster, you need the only 4GL that doesn't rely on COBOL or C to fill in the missing pieces.

INFORMIX-4GL.

A complete COBOL replacement.

Unlike other DBMS products, INFORMIX-4GL is a complete application development language for SQL databases. It's the only 4GL with full screen-building, report-writing and SQL database I/O capabilities designed into a single programming language. Which means it's a real COBOL-replacement-caliber tool. So you'll rarely have to revert to COBOL or C to customize an application.

10 times faster than COBOL. 3 times faster than any other 4GL.

When you leave COBOL and C behind, high productivity kicks in. In fact, with INFORMIX-4GL, you'll be able to deliver even the most complex custom applications at least 10 times faster than you can with COBOL or C. And 3 times faster than with any other 4GL.

Moreover, application debugging and maintenance are a breeze with our INFORMIX-4GL Interactive Debugger. You can view and debug your 4GL source code while the program runs. Even maintenance time will be reduced drastically. After all, with the non-procedural syntax there's less code to maintain. And the debugger makes it easy for others to understand and maintain your code.

What's more, our INFORMIX-4GL Rapid Development

Here's what it takes to make a complete 4GL. And only Informix has it all.

- ☑ Complete report-writing screen-building and database I/O language in a single product.
- ☑ Language comprised of non-procedural statements.
- ☑ Language flexibility equal to COBOL or C.
- ☑ Full SQL implementation.
- ☑ Application portability without recompiling.*
- ☑ Complete source code debugger capability.
- ☑ A 10 to 1 increase in developer productivity.

Send for our free booklet, "How To Choose An RDBMS."

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____ Phone _____

Please check the boxes that apply to you:

- ☐ Business User
  - ☐ Over 1000 employees
  - ☐ 100 to 1000 employees
  - ☐ Less than 100 employees
- ☐ VAR/Developer
- ☐ Computer Reseller
- ☐ OEM
- ☐ Gov't. Organization
- ☐ Educational Institution
- ☐ Student
- ☐ Other _____

What kind of hardware/operating system do you use?

_____

_____

I plan to purchase a DBMS product:

- ☐ within 6 months
- ☐ 6 months or longer
- ☐ do not plan to purchase

#1 for good reason.

© 1988 Informix Software, Inc.
CW4-6

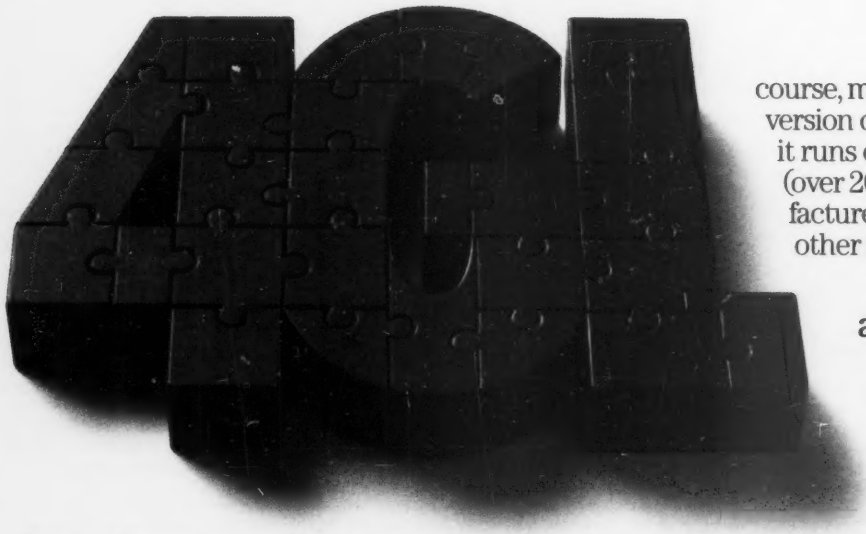
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 2502 SHAWNEE MISSION, KS

POSTAGE WILL BE PAID BY ADDRESSEE

Informix Software, Inc.
P.O. Box 15998
Lenexa, KS 66215-0998

latabase in UNIX.
complete 4GL.



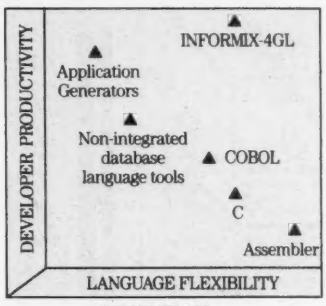
course, most every known version of UNIX. Better yet, it runs on more machines (over 200) from more manufacturers (85) than any other DBMS.

All that and a best-seller, too.

Informix DBMS products for UNIX, including INFORMIX-4GL, outsell their closest competitors by a substantial margin. So if you subscribe to the theory that there is safety in numbers, rest assured. With INFORMIX-4GL, the numbers are on your side.

System lets you compile your code in a fraction of the time you'd normally take. And you can port your applications to other operating systems without rewriting or recompiling a single line of 4GL code.*

INFORMIX-4GL is as flexible as conventional languages, but provides all the power of a 4GL with its non-procedural syntax for handling menus, forms, reports and SQL.



INFORMIX-4GL vs. other application-building tools.

Plus it's more portable.

You can take INFORMIX-4GL just about anywhere—MS-DOS, OS/2, VMS, and, of

Free booklet, "How To Choose A 4GL."

For a free copy of our new guide, "How To Choose A 4GL," call or write Informix Software, Inc., 4100 Bohannon Drive, Menlo Park, CA 94025. (415) 322-4100.

And solve the 4GL puzzle. Completely.

INFORMIX

#1 for good reason.

*Obviously, mixed 4GL/C programs or code written to take advantage of specific operating system features may need to be rewritten or recompiled.

Informix is a registered trademark of Informix Software, Inc. UNIX, MS-DOS, OS/2 and VMS are registered trademarks of their respective manufacturers. © 1988, Informix Software, Inc.

Firms turn to business analysts

The job, also called account executive, can broaden career prospects

BY SHERYL KAY
SPECIAL TO CW

As MIS shops increasingly assume the stance of service organizations, they are creating the position of business analyst, sometimes known as account executive, to reach out to customers.

While business analysts typically continue to report to MIS, they work in a user department. The arrangement generates benefits for corporate management and also can boost career prospects for systems professionals who take on the job.

Systems professionals are following technology out of the MIS shop and into user departments, says James Frazee, a former account executive at Richardson-Vicks, Inc. in Wilton, Conn.

"It's happening in more and more places," Frazee says. "I think a lot of it is because the technology has reached the point that people have a chance to get out."

With technology changing so fast, users need help in keeping up with it, adds Frazee, who now provides customer support for systems sold by Dun & Bradstreet Corp.'s Nielsen Marketing Research Service.

Frazee previously oversaw sales and marketing systems at Richardson-Vicks, determining what functions users needed and how the systems to provide them would be implemented. "I looked after the needs of the division from a systems point of view," he says.

The approach provides two advantages for companies, according to Tom Pettibone, who set up the Richardson-Vicks program and later started one at New York Life Insurance Co. in New York, where he is vice-president of information systems and services.

"First, by being with our customers daily, the analyst makes [the MIS organization] a better vendor to our users," Pettibone says. "Secondly, in the day-to-day planning and work of that customer department, he or she will bring a systems awareness to the floor immediately."

When a new product or service is being considered, the analyst can bring systems capabilities into the picture early in the game, Pettibone says.

Throw away the blinders

Like Frazee, Phyllis Singer, who was promoted to business analyst at New York Life's individual insurance department a year ago, stresses that people in her position can acquire a broader view of the corporation.

"You have to understand the challenges the users are up against, not just as it relates to data processing but in terms of corporate challenges and industry challenges," Singer says.

> "YOU HAVE TO understand the challenges the users are up against, not just as it relates to data processing but in terms of corporate challenges and industry challenges."
>
> PHYLLIS SINGER
> NEW YORK LIFE

Frazee says MIS shops where he worked before Richardson-Vicks were insulated from users. "They go by what systems they think the business wanted," he says. As an account executive, he says he was able to see how systems would fit in with the company's long-range strategic plan. "That's the key that's missing in a lot of places," he says.

The role of business analyst can attract technical professionals on the basis of potential for promotions, particularly where openings in the traditional career ladder seem unlikely, says MIS recruiter Hal Sullivant, president of recruitment firm Linn-Truett, Inc. in San Antonio.

Pettibone notes that business analysts gain opportunities in user departments as well as MIS. "I may have difficulty in pulling some of these folks out of the customers' side of our business," he says. "They could definitely be prime candidates for senior management positions within the customer areas."

Singer, who became an assistant vice-president with her move to business analyst, sees her position providing the knowledge of business necessary in both MIS and user departments.

"Whether you stay in DP or move on to other areas, the business analyst role gives you the insight that you need," Singer says.

The knowledge of systems also can be a strength for a business analyst leaving MIS for a job with a business area, Frazee notes. "The systems group really has an opportunity to look at the whole business because everything is becoming so integrated," he says.

A business analyst who climbs up the career ladder on the user side may find himself considered for new opportunities back in MIS — even in the top job, Sullivant says.

Business analysts have emerged in several industries, including manufacturing, retail and utilities. The bulk of the positions, however, seem to be in insurance and banking.

Sullivant suggests this pattern occurs because "the marriage between the banker and data processor, for example, is so much more solid than in other industries."

What it takes

Managers agree on the attributes that make a good business analyst. A candidate must possess outstanding communication and presentation skills to serve as liaison between users and MIS, combined with business knowledge.

A background in project development and management, particularly with large systems, is also important. These experiences will bring a professional through an entire systems development cycle.

But business analysts must "get out of the bits and bytes mode," Frazee says. "A lot of people have trouble seeing things at a higher level. They like things nice and ordered."

Kay is a Tampa, Fla.-based business consultant and free-lance writer specializing in emerging technologies and human resources.

NEW DEVELOPMENT OPPORTUNITIES

Sierra Systems Consultants has provided high quality application development services to business and government since its inception in 1966. Our services include long range information systems planning, feasibility studies, analysis, design, development and implementation.

Opportunities for all levels of systems development professionals exist in our Dallas, Los Angeles, Seattle, Vancouver and Victoria offices. Our compensation plan is designed to attract and retain only the best. Company funded education is provided to keep you current. Relocation assistance is available.

If you have a minimum of 3 years experience with IBM mainframe or DEC VAX hardware, experience in two or more of DB2, IMS, ADABAS, NATURAL, POWERHOUSE, CICS or COBOL and are seeking a challenging position in a variety of new development environments, we would like to hear from you.

Please send your resume and salary history to Jim McGavin, Sierra Systems Consultants, 4720 Lincoln Blvd., Ste. 250, Marina del Rey, CA 90292

or call (213) 827-3799

SIERRA
Systems Consultants

Data Processing
DSM
DIAMOND-STAR MOTORS

NEW PLANT
NEW CAR
NEW CAREER
POTENTIAL

Get involved with automotive breakthroughs of both America and Japan. This Mitsubishi-Chrysler joint venture is staffing its new, 2 million sq. ft. plant in Normal, Illinois. We are the most technologically advanced automobile manufacturing facility in the world with over 400 robots. Our computer center consists of two IBM 4381-14 host computers and two Mitsubishi Electric Computers for assembly line control.

SYSTEMS ENGINEERS

The candidate should have experience with large on-line manufacturing business application, IBM mainframes 4300 family or larger. COBOL experience required. Experience with on-line data base applications, software package installation and support a plus.

Positions require a Bachelor's Degree plus a minimum of 3-5 years IMS experience. Send resume with salary history to:

Recruitment and Placement SE
Diamond-Star Motors Corporation
100 N. Diamond-Star Parkway
Normal, IL 61761

No Phone Calls Please
AN EQUAL OPPORTUNITY EMPLOYER

SENIOR SYSTEMS PROGRAMMER

Blue Cross and Blue Shield of Kentucky, the leader in the health care prepayment field, currently has an opening on its Systems Software staff. If you have the following qualifications:

- Five years detail level experience with MVS/XA internals. Emphasis on systems tuning MVS/XA, JES2, ACF VTAM and NCP.

Consider advancing your career with us. Ours is a 3084/3081/3083 MVS/XA operation, supporting a statewide teleprocessing network.

We provide:
- Competitive salary
- Outstanding employee benefits
- Excellent working conditions

Qualified applicants please send resume including salary requirements in confidence to:

Employment Office

Blue Cross Blue Shield Delta Dental of Kentucky

9901 Linn Station Road, Louisville, KY 40223

Equal Opportunity Employer

S/38 PROGRAMMER ANALYSTS

A growing and evolving field meeting the sophisticated needs of the health care industry – prestigious international Fortune 75 corporation – desirable location in suburban Orlando – leadership position in health care information systems built through marketing expertise and technical know-how. That's the kind of environment and support you'll find at Baxter Healthcare Corporation's Systems Division.

A major provider in the development, installation and support of health care information systems, we're now seeking programmer analysts with RPG III experience on IBM System 38 and/or AS/400. A BSCS or equivalent and top communication and analytical problem solving skills also needed. Any hospital applications experience is helpful.

Baxter provides excellent compensation, including relocation assistance, tuition reimbursement, credit union, retirement plans, and more. For consideration, send resume in confidence to: **Elaine Kirchner/Dept. CW/1-30, Healthcare Systems Division, Baxter Healthcare Corporation, 587 Sanlando Springs Drive, Longwood, FL 32750.** Equal Opportunity Employer.

Baxter

Senior Consultants
Marketing Representatives
Director of Education

Codd and Date, Inc. has several positions available for technical people expert in relational database management, several for marketing representatives, and one position for Director of Education.

Technical experts must have at least 4 years of experience in installing, designing databases and applications, and tuning IBM's DB2, plus at least two years experience in two or more additional relational database management systems (e.g., SQL/DS, ORACLE, INGRES, etc.). Additional requirements include teaching and training experience, as well as experience in courseware development.

Marketing representatives must have at least 4 years experience in marketing RDBMS products and/or services.

Director of Education must have a minimum of ten years of DP experience and 2 years of experience with IBM's DB2 and at least one other relational DBMS. Knowledge is also required of the relational model and related technologies.

These positions are available primarily in the New York Metropolitan Area, the Delaware Valley, and the San Francisco Bay Area. However, qualified applicants who prefer other areas will be considered.

All positions require excellent command of English (both oral and written) plus excellent pedagogic and presentation skills. The job entails some travel within the United States, Canada, Europe, South America, and Australia.

Please submit resumes to:

Personnel Dept. – CW
Codd and Date, Inc.
P.O. Box 20038
San Jose, CA 95160

Oberlin College
Analyst/Programmer

The Irvin E. Houck Computing Center at Oberlin College is seeking an experienced and highly motivated individual to fill a challenging **Analyst/Programmer** position in Administrative Computing Services.

The successful candidate will join a team responsible for designing, developing, and supporting information systems that serve various departments such as Admissions, Financial Aid, Residential Services, and the Office of the Registrar. At present this group is involved in an array of creative and challenging projects, including the implementation of a relational database management system and the integration of Apple Macintosh and DEC VAX/VMS systems. Future developments in which the incumbent will be involved are likely to include the production of an executive information system, design of a new user interface standard for administrative software, and the implementation of a campus-wide distributed network of departmental databases.

This position requires a Bachelor's Degree, at least two years of experience in software systems development, and excellent oral and written communication skills. The ideal candidate will display familiarity with DEC VAX/VMS systems.

Oberlin College is a nationally recognized liberal arts college with an enrollment of approximately 2800 students. Located near Cleveland and the shore of Lake Erie, the town of Oberlin offers a high level of cultural excitement, diverse recreational opportunities, and a low cost of living, allowing the best of both working and living environments.

Salary for this position is competitive and will be commensurate with qualifications. The superb benefits package includes a generous pension program, fully paid medical and long-term disability insurance, one month's annual paid vacation, life insurance, tuition support for children, and relocation assistance.

An interested candidate should send a letter of application, complete resume or curriculum vitae, salary history and/or requirements, and the names and telephone numbers of three professional references to:

Michael Dieckmann
Director of Administrative Computing Services
Irvin E. Houck Computing Center
Oberlin College
Oberlin, Ohio 44074
(216) 775-8290

Application materials should be received by March 1, 1989 to ensure consideration. Applications received after that date may be considered until a qualified candidate is appointed. Oberlin College is an Affirmative Action, Equal Opportunity Employer.

Data Processing

No Surprises

As a skilled data processing professional, you know the necessity of being precise. If what you do isn't clear, you may get unexpected results. So we want to make this perfectly clear, so there'll be no surprises.

Since 1973, Compuware has been one of the leading professional services companies because we make sure our people and products are the best they can be. Not just meeting, but creating industry standards.

We are looking for people who like the flow of changing challenges and a variety of assignments; who put exceptional effort into what they do, because they're serious about what they do, and who enjoy the reward and recognition that follow.

We have immediate career opportunities in our

Professional Services Division

We're looking for qualified professionals for positions ranging from Programmer through Senior Systems Analyst. You must have at least 2 years' industry experience, with hands-on skills in any of:

- OS/MVS, COBOL with IMS, DB2, IDMS, CICS, TELON or DATACOM
- OS/MVS, with ALC, COBOL or PL/1
- OS/MVS, CICS or TPNS internals/systems programming
- DEC/VAX with RDB, COBOL or PL/1
- Experience in the Banking-Financial environment. Knowledge of Portfolio Accounting, Mutual Funds and Multi-Currency Systems.

These positions are currently available in Baltimore, Boston, Detroit, Hartford, Washington DC and Wilmington.

Software Products Division

- Software designers and developers. IBM ALC with OS/MVS, VTAM or CICS internals a must. (Detroit)
- Software product managers with experience in product research, development, and marketing. Solid IBM OS/MVS products background. (Detroit)

Education Resource Division

- Database instructors. IMS/DB/DC, or DB2 or IDMS essential. (Detroit, Washington DC)

Sales

- Representatives for Software Products Division. Previous experience required. (all offices)

For what could be a nice surprise, please send your resume and salary requirements to Mary Kay Andries, Compuware Corporation, 31440 Northwestern Highway, Farmington Hills, MI 48018-5550. Or call, (313)737-7300.

COMPUWARE
Because experience is everything.
An Equal Opportunity Employer

The Food and Agriculture Organization of the United Nations (F.A.O.) requires a

PROCUREMENT SYSTEMS OFFICER

Position:
Will be responsible for the monitoring and improvement of the computer based systems of the Purchasing and Control Branch at FAO's Headquarters in Rome - Italy.

Qualifications:
University degree in computer science, business administration, mathematics or related field of specialization or acceptable technical qualification in computer technology. Five years' professional experience on large computer systems, applying modern computer techniques, including computer programming, system analysis and office management. Extensive experience in basic software environments used in DEC systems, such as VAX VMS, DBMS, TDMS, RSX and related products. Full working knowledge of English. Good knowledge of traditional development tools such as third generation programming languages and basic access methods. Experience on microcomputers and related basic software tools such as DBase III, Spreadsheets, etc. Knowledge of TP environments, techniques and tools and of the Italian, French or Spanish language is desirable.

Benefits:
Tax-free salary, relocation, cost of living adjustment, education grant and other benefits of international civil service.

Please send detailed curriculum vitae not later than 2 March 1989 quoting VA 519-AFS to:

CENTRAL RECRUITMENT - FAO
Via delle Terme di Caracalla
00100 Rome - Italy

CONTRACT PROGRAMMERS
WITH A MINIMUM OF 4 YRS EXP.
Up to $35 per hour

IMS/DB/DC
SQL, DB2, ADF
TELON, IDEAL
ADR/DATACOM
ADABAS/NATURAL
IDMS/ADS/O/OCS
MSA EXPERT
PRIME 9000
INFO/BASIC
IBM SYSTEM 38
UNISYS, ADA
FORTRAN, GKS
DEC, VAX
PDP-11, FMS

* Permanent and Contract Positions available
* FOCUS w/Computer Science Degree OK/TX
* Systems Programmer
* DOS/VSE Hou.
* Data General
* FORTRAN 77
* Numerical Control Programmer

We have openings in CA, TX, LA, MO, OK, IL, OH, MI, NC, VA, and West VA.

J.P.S. INC.
P.O. Box 690007
Houston, TX 77269-0007
(713) 820-0024
Fax (713) 251-5904
No trainees or part-time positions
Equal Opportunity Employer

KENDA SYSTEMS, INC.
BOSTON ● NEW YORK ● WASHINGTON

SOFTWARE CONSULTANTS

KENDA SYSTEMS provides consultants to the East Coast High Tech Community. Talented professionals who take pride in their work are welcome to register with KENDA SYSTEMS.

- *DB: VAX/VMS/PASCAL/RDB/DOD
- *REAL TIME: VAX/VMS/SIGNAL PROCESSING/DOD
- *DATABASE: SQL/MS-WINDOWS/ NETWORKING
- *PROCESS CONTROL: SUN/UNIX/C/ASM
- *QA TESTING: PC/C/ASM
- *TECH WRITER: HARDWARE/MILITARY DOCUMENTATION
- *QA TESTING: PC/TESTSCRIPTS/1-2-3 OR SYMPHONY
- *HARDWARE DRIVERS: RT PROCESS CONTROL/C/UNIX/ROBOTICS
- *SYSTEMS PROGRAMMER: DG AOS/VS/C

Forward resume to Richard Pierce.

2 Manor Pkway., Salem, NH 03079 603/898-7884

DATA BASE ANALYST

Overseas Opportunity

We have been retained by our client to recruit a Data Base Analyst who possesses a BS/BA degree in Physical Science, Computer Science, Engineering, Mathematics or Business. To qualify, you will need at least 8 years experience in Data Processing with 3 years recent experience to include:

- DBD and PSB control block gens
- Data base design
- Data backup/recovery

• OUTSTANDING COMPENSATION
• NO RESUME REQUIRED

To apply **CALL OUR 24 HOUR/7 DAYS PER WEEK TOLL-FREE NUMBER LISTED BELOW.**

1-800-872-7022, EXT. R-77
CALL TODAY OR ANYTIME!

RES RECRUITMENT ENHANCEMENT SERVICES, INC.

Researcher, computer scientist: Advanced software eng. dev. Conduct courses on object-oriented designing & programming in software engineering, including Eiffel language. Publish articles on Eiffel & Cepage. Must have thorough knowledge of advanced software eng. technolog.: object-oriented programming, formal specification of software system, "case" tools, syntax-directed editors. Ph.D. in Computer Science or Math + 3 yrs. exper. reqd. $36,000/yr. Job site & interview: Goleta, CA. Send this ad & resume to Job #CR15770, P.O. Box 9560, Sacramento, CA 95823-0560 not later than 2/14/89.

Computer Systems Engineer. Location: Los Angeles and New York City. Will conduct company-customer technical interface and software troubleshooting for MVS/370 and MVS/XA product lines. Must have Bachelor's Degree or equivalent in Computer Science, Mathematics or related field and 4 yr. systems software experience including MVS operating systems and related software products. Must have expertise in internal algorithms and performance aspects of MVS/370 and MVS/XA operating systems and associated hardware and software. Salary: $4,500/mo. Send resume to G. Angel, Dept. CS, 15707 Rockfield, Ste. #135, Irvine, CA 92718.

Northern California

EXCLUSIVE POSITIONS

Contract & Permanent
IDMS, CICS, IMS
VAX-RDB

- V.P. MIS
- Sr. Prog. Analyst
- Sr. Bus. Analyst
- Project Managers
- Systems Programmers
- Data Base Analysts
- Technical Editors

Chuck Klein & Assoc.
1634 Ridgewood Road
Alamo, CA 94507
(415) 831-1059

Rapidly growing New York, New Jersey and Connecticut area consulting firm looking for ambitious super D.P. Professionals for State-of-The-Art projects. We need all skills including: SUN WORKSTATIONS, TELON, UNIX/C, DB2, DB2/C, C/SQL, CICS/C, ADMINISTRATORS (SUN & UNIX), TESTERS (UNIX) and VAX/VMS.

Please call or send resume to Tekmark Computer Services, Inc., 37 East 29th St., New York, NY 10016. (212) 686-9360, Fax# (212) 683-4047.

NH - MAINE

PROGRAMMERS PROGRAMMER/ANALYST

OS/MVS. 2 - 5 years experience. COBOL, CICS (a must), IDMS, DB2. Excellent salaries, benefits and relocation plans.

Fee paid. Reply in confidence to:

ROGERS AND SEYMOUR
PERSONNEL CONSULTANTS

222 Auburn St.
Portland, Me. 04103

Systems Analyst (New York Metro Area)

Analyze clients' needs. Design, develop, implement and maintain database systems for commercial applications, utilizing IDMS, ADS/O, Culprit, Panvalet and PL/I on IBM mainframes operating under MVS and on microcomputers operating under PC-DOS. Install, customize and enhance IDMS databases. Bachelors in Computer Science. 2 years experience doing above. 40 hr/wk. $37,000/yr. Resume to:

RCG Resources, Inc.
111 West 40th St., 29th Fl.
New York, NY 10018
Attn: Bob Beaudet

DATA BASE PROFESSIONALS
Maryland, New York, Atlanta, Denver, St. Louis, Raleigh

Management Decisions is a professional service corporation providing manpower to many large corporations throughout the U.S. We currently have needs for the following consulting skills:

Oracle Staff Consultant: 1-2 years Oracle experience. Manage project teams of 1-3 persons.

Oracle Sr. Consultant: 2 years + experience Oracle RLDB. Strong analysis and design skills.

Mr. Howard Leff
(404) 451-1966
MDI Inc., Suite 400
4360 Chamblee-Dunwoody Rd.
Atlanta, Georgia 30341

When you compare costs and the people reached, Computerworld is the best newspaper for recruiting qualified computer professionals.

Place your ads today!

Call toll-free 800-343-6474

Or in Mass (508) 879-0700

Information Systems Opportunities

ANALYSTS/PROGRAMMERS

Deere Credit Services, Inc., a growing subsidiary of Deere & Company is expanding its Information Systems Department at our corporate location in West Des Moines, Iowa.

Our continuing expansion creates exciting opportunities for qualified professionals with a 4-year degree in Computer Science or related area, a minimum of 2-3 years experience and good communications skills.

These positions require backgrounds in the following areas:

- IBM 3090, MVS/XA
- CICS Release 1.7
- IMS DL/1
- COBOL, SAS (Panvalet helpful)
- TSO and ISPF
- Familiarity with AMS products (CACS, ACAPS and/or BUREAU Link) highly desirable

We offer a competitive salary and benefits package combined with opportunities for advancement.

In order to be considered for these IMMEDIATE OPENINGS, we prefer to review all resumes no later than February 15th, 1989. Send your resume, including salary history to:

Corey Mills
Personnel Supervisor
Deere Credit Services, Inc.
P.O. Box 65090
West Des Moines, IA 50265

DEERE CREDIT SERVICES, INC.

Deere Credit Services is an Equal Opportunity Employer M/F

COMPUTER PROFESSIONALS

Professional well-established, Anchorage based computer service and sales company is seeking independent computer professionals for contract opportunities. Immediate assignments available for individuals with 3-5 years experience and expertise in the following areas:

WANG PACE, IDMS/ADSO, ADABAS/NATURAL II

Send resume stating precise hardware/software experience and three references to:

ComRim Systems, Inc.
580 E 34th Ave., Suite 200
Anchorage, Alaska 99503
(907) 563-0304

HOST SYSTEMS PROGRAMMER/ANALYST to develop and maintain on line systems software for mainframe computer. Designs Instructional Support Programming Facility (ISPF) using PL-1, FORTRAN, FOCUS, MARK IV and SAS language. Provides technical guidance to users. Must have minimum B.S. in Computer Science + 6 months experience in Systems Programming. Must be able to communicate effectively with technical personnel, and to do technical analyses (standardized test is given). Must know FORTRAN and PL-1 languages. Hrs. 7:45 A.M. - 4:45 P.M. Salary: $1,765/mo - $2,763/mo. Submit resume only to Job Service of Florida, 701 S.W. 27 Avenue, Room 15, Miami, Florida 33135. Ref. Job Order #FL-0034774.

Genetics Research Assoc/Project Manager. A geneticist with experience in relational data base programming and record linkage is required to manage a state wide program in reproductive outcome. Duties will require linking birth certificates and health records using INGRES-EQUEL, performing statistical analyses and writing annual reports, as well as, administering the data entry of selected Utah birth certificates. Requirements: Degree in Genetics, 2 years experience with relational data base management (INGRES preferred), UNIX, record linkage techniques, and management and analysis of large databases of health statistics. Contact: Utah Job Service I.D. #3948904, 1234 S. State, SLC, UT 84101 (801) 533-2180

CICS SENIOR P/A

Top notch professional with a minimum of 3 to 5 years of IBM MVS/XA CICS programming experience to develop sophisticated new on-line catalog order processing system and to enhance its order entry and distribution systems.

Eddie Bauer, Inc. a rapidly growing national specialty retailer headquartered in the greater Seattle area has exciting new opportunities. Send resume and salary requirements to:

Eddie Bauer
Human Resources- SP
14850 NE 36th Street
Redmond, WA 98052
EEO, M/F

DEC
Programmer/Analysts
To $36,000

Several of our DEC VAX Clients are looking fo Senior Analyst/Programmers with either COBOL or BASIC experience. These positions are with major midwest corporations and require 2 or more years of programming in business or research applications. Plusses are database experience, BS degree, ALL-IN-1, Datatrieve, and Rally. Call for details.

ROBERT HALF
DATA PROCESSING
7733 Forsyth Blvd.
St. Louis, MO 63105
(314) 727-1535
FAX: (314) 727-1321

Recruit qualified computer and communications professionals with the IDG Communications Computer Careers Network of four leading computer newspapers.

Call Lisa McGrath at:

(800) 343-6474

for more details.

CA & AZ CONTRACTS

CONSULTANTS WANTED

P. Murphy & Associates, Inc.
10000 RIVERSIDE DR., NO. 5
LOS ANGELES, CA 91602
818/508-8474 714/552-0506

How to place your recruitment ad in Computerworld's Computer Careers section:

It's easy. All the information you need is right here. Just fill out the form and send it in. Or call Lisa McGrath at (800) 343-6474 (in MA, (508) 879-0700). (You can even fax the form to us at (508) 620-7739).

Rates:

☐ $9 per line one region ($126 per column inch)

☐ East ☐ Mid-West ☐ West

☐ $11.60 per line for two regions ($162.40 per column inch)

☐ East/Midwest ☐ Midwest/West ☐ East/West

☐ $13.50 per line national edition ($189.00 per column inch)

To reserve space, you need to call (800) 343-6474 by 5PM (all continental U.S. time zones) 5 days prior to the Monday issue. We need your ad materials (or the information in your ad by telephone) by 5PM the next day. Blind Box charges are $25 (US) and $50 (Foreign)

Copy:

We'll typeset your ad at no extra charge. Please attach clean, typewritten copy. Figure about 25 words to a column inch, not including headlines. Minimum ad size is 2 column inches. Any special artwork should be enclosed with your ad also. Logos must be submitted on white bond paper for best reproduction.

Issue Date(s) - issued every Monday: _____

Name: _____

Title: _____

Company: _____

Address: _____

_____

_____

Telephone: _____

COMPUTERWORLD CLASSIFIED ADVERTISING

Box 9171
Framingham, MA 01701-9171

Executive Life. If you can hack it.

If you're prone to performance over-drive, Executive Life offers a challenging environment in which you can excel. We're the largest life insurance company in the Western U.S. and we value Programmers/Systems Analysts who don't know when to stop.

We're currently looking for achievement oriented individuals who find satisfaction in working long, hard hours with state-of-the-art IBM hardware and not so state-of-the-art software. Our environment is OS/MVS, JCL, TSO/ISPF. Knowledge of life insurance products and troubleshooting background with IBM equipment is essential. Experience in other types of financial institutions may be considered.

Our benefits package is top rate and includes a Health & Fitness Center, employee restaurant, flexible spending account, tuition reimbursement, comprehensive medical/dental/life insurance plans, and a new child care resource assistance program.

We continue to surpass our own growth projections . . . now it's your opportunity. If you can hack it, call John McFarland at 1-800-323-8617 or 213-312-2311 or send your resume to: Executive Life, 11444 W. Olympic Blvd., Los Angeles, CA 90064. EOE. Principals only.

EXECUTIVE LIFE

Make a Difference with Tandem in 1989.

Tandem Computers is a world-leader in computer systems and networks for on-line transaction processing (OLTP). Because we're setting the pace in OLTP technology, we'll continue to offer Customer Support professionals the opportunity to make a difference in 1989. A difference not only within Tandem, but across the entire OLTP industry—in product innovation, quality, price/performance, and customer satisfaction.

Customer Support Opportunities

ON-LINE SUPPORT ANALYST—AUSTIN, TX

An integral part of Tandem's U.S. support network is the On-Line Support Center in Austin. In this position, you'll provide direct telephone customer support for Tandem software products. This will include addressing customer questions on proper product usage, isolating software problems, and working with other departments to ensure the continued reliability and quality of both Tandem's products and support efforts. This position requires a BSCS, or equivalent, with 2–4 years in system support, and previous software support experience. Knowledge of Tandem systems and/or host communication principles strongly preferred.

DATA COMMUNICATIONS SOFTWARE SUPPORT SPECIALISTS—CUPERTINO, CA

Are you a data communications software support professional with "development level" system software skills, but who prefers success on a daily basis? Our specialists troubleshoot and isolate faults in data communications and networking system software, and provide liaison between our field support and development organizations. Requires strong interpersonal skills under pressure, experience with block structured languages, and demonstrated problem-solving ability through the use of low-level code debugging and/or dump analysis. Familiarity with communications data scope reading and trace analysis is desirable. Some travel may be necessary. Three or more years' industry experience and a BSCS/EE or equivalent experience is mandatory. SNA, X.25, and OSI skills preferred.

LARGE SYSTEMS TECHNICAL SUPPORT SPECIALIST

Tandem Headquarters support opportunity for people possessing a minimum of 8–10 years of experience in large networks, large databases, and complex systems integration. The large systems group provides support to the Tandem field organization on performance, design, integration, and systems issues. This position provides you the opportunity to work on leading-edge systems and customer solutions on a worldwide basis. A solid background in SNA, SQL, PCs, and LANs is desirable.

SOFTWARE COURSE DEVELOPERS

Positions exist in Santa Clara, CA for individuals with expertise in developing courses that teach software and data base products to customers. Experience with Tandem products is preferred, but not necessary.

SOFTWARE INSTRUCTORS

Positions exist in major metropolitan areas of the U.S. Expertise as a software instructor with a computer vendor is required.

Individual development is promoted through a wide spectrum of resources and rewards, like ongoing training, a creativity awards program, performance-based compensation plans, and a sophisticated employee communications system that includes video teleconferencing and worldwide electronic mail. Please send resume (indicating position of interest) to TANDEM COMPUTERS INCORPORATED, Attn: Dept. HF/CW, 19191 Vallco Parkway, MS 4-03, Cupertino, CA 95014. We are an equal opportunity employer m/f/h/v. Principals only, please.

TANDEM
Where outstanding people develop together.

Join the utility serving three million Texans

We're Houston Lighting & Power and we generate over one-third of all the electricity produced in Texas. Currently we're looking for computer professionals to enhance their careers at our South Texas Project Nuclear Plant. Our state-of-the-art Pressurized Water Reactor Electric Generation Station is one of the most technologically advanced nuclear facilities in America.

Development Analyst

Must have a bachelors degree in Computer Science; Engineering, or related field. Equivalent experience will be accepted. Position requires a minimum of 2 years experience in Prime Programming. Responsibilities will include program analysis and business application development. Prime information experience desirable.

Software Support Supervisor

A degree in engineering, Computer Science, Management or related experience. 5 years experience in computer applications development, 3 years using computerized project management tools in this development and 1 year in a supervisory capacity.

The individuals we seek must possess good oral and written communication skills.

Employees enjoy competitive salaries and a comprehensive package of benefits including a generous relocation program. If you have the ability to match the ambition, please send your resume to:

Houston Lighting & Power
Attn: V. Harris
South Texas Project Recruitment
Dept. CW130, P.O. Box 289
Wadsworth, TX 77483

The Light company
Houston Lighting & Power

Equal Opportunity Employer
Principals Only Please

"REQUIRED"

A leading Saudi Computer Company intends to appoint a

PROGRAMMER

knowledgeable in writing compilers and interpreters. The applicant must be an energetic, smart, and talented person; who is freshly graduated from University with high academic achievement grades, and skills. If the above description fits you, please send your C.V. and relevant information to:

P.O. Box 43379
Riyadh 11561 Kingdom of Saudi Arabia
Attention: MIS Manager

EDGE BUSINESS SYSTEMS, LTD.

SILVER

SYSTEM/38 EXPERTS

We need your talents! If you have analytical ability, creativity and technical skill, we want to talk to you! Silveredge Business Systems, a growing professional consulting service organization currently specializing in the System/38, is seeking highly-visible, experienced Analysts and Programmers to join our team.

Committed to quality in our management practices, we provide variety, challenge and assured state-of-the-art technology with our own AS/400.

We offer a comprehensive benefit package including health, dental, disability, life insurance, and compensate 1.5 times your normal pay for overtime, plus Relocation/Bonus Fee.

Positions are located in the Chicago area. For confidential consideration, send your resume including salary requirements or call:
Sue Beulke at 312-449-7738,
Silveredge Business Systems,
One Westbrook Center, Suite 300,
Westchester, IL 60153. EOE M/F

WCI
MANAGEMENT INFORMATION SERVICES OF DUBLIN, OHIO

Our environment has grown from 4381-P2 running DOS VSE in January '87 to 3090 180E MVS/XA, JES2, VTAM, NCP, CICS, VSAM ROSCOE, TSO, plus an AS400B60. We have most importantly expanded our MIS staff with some terrific people now totalling 86. Our Technical/Communications Support staff is 7; we would like to increase to 10. Major development activity for 1989 includes: Distribution Requirements Planning, Finished Goods, Inventory Planning and Control, Marketing and Sales Performance, Production Scheduling and much more. Between now and mid 1990, we expect to install up to 24 AS400's around the U.S. supporting our Service Business. Development Support will be from Dublin (a suburb of Columbus) using a standardized set of software. We see the next two years to be every bit as demanding, exciting and challenging to all of us.

SYSTEMS PROGRAMMERS

These positions require a minimum of 3 years in Systems Programming. The individuals accepting these assignments will be involved in 1989 implementation of ESA and evaluating moves from a clean VSAM environment to DATABASE.

COMMUNICATIONS SYSTEMS ANALYST

SNI Connections to multiple 3090's in Western Europe to major retail chains, Sears and Wards; SNA linkage to 12 major manufacturing divisions; electronic mail; file transfer systems; and a CICS Network exceeding 600 terminals. Minimum 3 years systems programming. VTAM, NCP, JES2 experience needed.

SYSTEMS ANALYSTS

Minimum requirements for these positions are 3 years of Systems Development, strong analytical skills, experience with COBOL, CICS, VSAM, ROSCOE and LIBRARIAN. Individuals must have the capability of leading projects in a dynamic environment.

AS/400 SYSTEMS ANALYST

Requires minimum 2-3 years of solid RPG 3 and CL. Analytical skills a plus.

All of the above positions require at least an Associate's degree in Computer Science or equivalent experience.

Please send resume, with salary requirements in confidence to: **Mike Flynn, Director MIS, WCI MAJOR APPLIANCE GROUP, 5000 Perimeter Dr., Dublin, Ohio 43017**

WCI MAJOR APPLIANCE GROUP

White Consolidated Industries, Inc.

An Equal Opportunity Employer M/F/H/V

UNIX SYSTEMS PROGRAMMER

Computer science degree required. 3-5 years experience in UNIX/C to work on communication/database micro computer project. Experience with Inter Process communication. Salary 33K+. Send resume to:

Academy Computing
2601 NW Expressway
Suite 110E
Oklahoma City, OK 73112
(405) 840-2791

Recruit qualified computer and communications professionals with the IDG Communications Computer Careers Network of four leading computer newspapers.

Call Lisa McGrath at:
(800) 343-6474
for more details.

COMPUTER CAREERS NETWORK

Now you can recruit the best qualified computer and communications professionals regionally, nationally and weekly.

How?
With IDG Communications new Computer Careers Network. Choose from the Network's four computer-related newspapers and tailor your recruitment message to the type of talented professionals you need to reach – professionals that read Computerworld, InfoWorld, Network World, Digital News, and Federal Computer Week. Then, target your audience by region. Or blanket the entire nation.

Call your local sales representative today for more information about Computer Careers Network's regional, national and weekly reach.

Sales Offices
John Corrigan, Classified Advertising Director, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171; 508-879-0700.

BOSTON: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, Nancy Percival, Account Executive; 800-343-6474. (in Massachusetts, 508-879-0700).

NEW YORK: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652; Warren Kolber, Regional Manager, 201-967-1350; Jay Novack, Account Executive 800-343-6474.

WASHINGTON, D.C.: 8304 Professional Hill Dr, Fairfax, VA 22031; Katie Kress, Regional Manager, 703-573-4115; Pauline Smith, Account Executive 800-343-6474.

CHICAGO: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018; Patricia Powers, Regional Manager, 312-827-4433; Ellen Casey, Account Exective 800-343-6474.

LOS ANGELES: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

SAN FRANCISCO: 18008 Sky Park Circle, Suite 145, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

It's the efficient way to recruit qualified computer professionals.

Now you can target your recruitment advertising to the qualified computer professionals you want to reach - where you want to reach them. All you need is the new IDG Communications Computer Careers Network. Here's how it can work for you:

You choose the newspapers. Depending on who you're looking for, you can select the combination of four newspapers that best suits your needs - **Computerworld, InfoWorld, Network World, Digital News,** and **Federal Computer Week** Editions.

You choose the region. If you wish to recruit within a specific area, you can advertise in the regional editions of the newspapers you choose - East, West, or Midwest. Of course, national buys of individual newspapers or various combinations are also available when you need to extend your reach.

You don't pay for readers you don't want. Gone are the days when you have to worry about paying for waste circulation. The Computer Careers Network puts you in touch with qualified computer professionals - and only those qualified computer professionals you need to reach.

To put the new Computer Careers Network to work for you - regionally or nationally - call the sales office nearest you. Or contact John Corrigan, Classified Advertising Director, at 508-879-0700.

Sales Offices

John Corrigan, Classified Advertising Director, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171; 508-879-0700.

BOSTON: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, Nancy Percival, Account Executive; 800-343-6474. (in Massachusetts, 508-879-0700).

NEW YORK: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652; Warren Kolber, Regional Manager, 201-967-1350; Jay Novack, Account Executive 800-343-6474.

WASHINGTON, D.C.: 8304 Professional Hill Drive, Fairfax, VA 22031; Katie Kress, Regional Manager, 703-573-4115; Pauline Smith, Account Executive 800-343-6474.

CHICAGO: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018; Patricia Powers, Regional Manager, 312-827-4433; Ellen Casey, Account Exective 800-343-6474.

LOS ANGELES: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

SAN FRANCISCO: 18008 Sky Park Circle, Suite 145, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

DATA PROCESSING OPERATIONS MANAGER

The City of Peoria (pop. 124,000) seeks applicants for the position of Data Processing Operations Manager: $27,586 - $40,937 annually; excellent benefits. Responsible managerial work in planning, organizing, and directing the operational division of the Data Processing Department. The City runs a 24 hour operation utilizing NCR V8500 series mainframe. Requires 4 year degree, major course work in computer science; considerable technical experience in electronic data processing including experience in a supervisory capacity. Equivalent combination of education and experience will be considered. Applications will be accepted until February 10, 1989.

Apply to:

Employment Manager
City of Peoria
419 Fulton St., Room 203
Peoria, IL 61602

EQUAL OPPORTUNITY/ AFFIRMATIVE ACTION EMPLOYER

PROGRAMMER/ANALYST

We offer top salaries and hourly rates along with excellent benefits including database/4GL training and stock options.

If you have experience in any of the following, please call us or mail us your resume immediately.

DB2/SQL	ORACLE
COBOL	IMS DB/DC
IDMS ADS/O	INGRES
ADABAS/NATURAL	S38/AS400
SAS	PC DOS and LAN
FOCUS OR PC FOCUS	SMARTSTAR
UNIX C	SYSTEMS PROGRAMMER

PROFESSIONAL SOFTWARE SERVICES
251 N. Illinois, Ste. 1184
Indianapolis, IN 46204
(317) 685-8484
1-800-833-3200

A Terrific Opportunity

Computer Consulting Group, one of the **Southeast's** fastest growing contract programming and consulting firms, has immediate openings for talented Programmer/Analysts with 2 or more years experience. Excellent salary & benefits package. We're especially seeking:

IDMS/ADSO MANUF
NATURAL/ADABAS
VAX/COBOL
VAX/FORTRAN
WANG/COBAL
MP/TRANSACT
VAX/RDB
S38/RPGIII
IBM PC/C
IBM PC/COBOL
OS/MVS/DB2
COBOL/CICS
HP 1000/FORTRAN
DEC/POPPLER
VAX SYS MGR
TECH WRITERS

Computer Consulting Group
Contract Professional Services

Research Triangle Area
4109 Wake Forest Rd.
Suite 307
Raleigh, NC 27609
1-800-222-1273

Our Fortune 500 clients in Okla, Texas & Mo. have challenging and rewarding opportunities for professionals with 1+ years experience in:

PL1/MVS	**to $39K**
IMS/PL1	**to $47K**
IMS/DBA's	**to $60K**
Netview/VTAM	**to $60K**
RPG3/S38/AS400	**to $48K**
TPF/ACP	**to $115K**

All positions offer excellent salary, benefit and relocation packages. If interested in these positions, or other opportunities, please contact our office or send your resume in strict confidence to:

JYI Computer Professionals
PO Box 471140
Tulsa, OK 74147
(918) 492-7535

RESEARCH TRIANGLE OPPORTUNITIES

Currently recruiting experienced computer pros with background in any of the following: IBM Cobol mainframe applications; CICS; IDMS; IMS; ADABAS; ORACLE; DB 2; FOCUS; ADR DATACOM; SAS; VM/CMS; S/36 RPGIII or COBOL; DEC/VAX COBOL or FORTRAN; HP3000; Series 1; Financial; Mfg.; Banking; Insurance; MSA; Point of Sale; MVS, VM, NCP/VTAM or CICS Systems Progrs; DEC/VAX Systems Mgrs; Database Analysts; Method 1 or similar methodology. Partial listing of local, regional & nat'l fee paid positions. Call or write:

The Underwood Group, Inc.
3924 Browning Pl., Suite 7
Raleigh, NC 27609
(919) 782-3024

S/38 Analyst/ Programmer

DHC Industries has an immediate opening for an analyst/programmer with proven database design experience.

The successful candidate will work independently to complete conversion of S/34-designed data files to field-described mode.

Further projects involve training in and use of the Synon/2 application generator.

Send resume, references and salary requirements to:

Marcus P. Hagen
DHC Industries
1709 15th Avenue
Eldora, IA 50627

or call: (515) 858-2335

PROGRAMMER/ANALYSTS & SYSTEMS PROGRAMMERS

FOR CAROLINAS AND SOUTHEAST

We have opportunities for on-line and database programmers and systems programmers for both in-house and consulting positions. Fee Paid. Please call or send resume to:

Keith Reichle, CPC
Systems Search, Inc.
203 Heritage Park
Lake Wylie, S.C. 29710
803/831-2129

(local to Charlotte, NC)

NCR PROGRAMMER/ ANALYST

Medium sized CIF installation. Requires an experienced, neat/3 level 2 programmer/analyst. VRX/Megapath/Online programming environment.

Work in a progressive organization with an excellent benefit package. In today's financial service industry, success is multiplying. Be a part of it!

Please send resume to:

Kathy K. Blackburn
Assistant Vice-President
Human Resources Department
First-Knox National Bank
P.O. Box 871
Mount Vernon, Ohio 43050

An Equal Opportunity Employer

CIM
Factory Process Automation

Utilizing DEC and other computers, Networking, PLC's, Distributed Control Systems etc. U.S. based technical and supervisory positions, all fee paid. Use a headhunter who specializes!

KEN COVA
COVA AUTOMATION SERVICES
5371 Shannon Park Drive, Dublin
OH 43017 (614) 792-9662

SENIOR PROGRAMMER ANALYST
(MSA Payroll/ Personnel Systems)

Riverside Methodist Hospitals, central Ohio's leading medical center, are currently seeking a dedicated, people-oriented professional to join our Information Services team in our new Information Services facility.

This Senior Programmer Analyst will customize, install, and maintain software packages as well as develop, maintain and document on-line and batch systems.

Requirements for this position include a Bachelor's degree in Computer Science (or closely related field) and at least 5 years experience that demonstrates excellent analytical, design and coding skills. Experience with IBM OS/MVS environment, COBOL, CICS and MSA Payroll/Personnel software packages is required.

Riverside Methodist Hospitals offer an attractive salary and excellent benefits, advancement potential and high calibre challenges that only a medical services leader can offer. Relocation assistance and/or spouse reemployment assistance, if needed, will be provided. For prompt consideration, please send resume and salary requirements to: **Peggy Potts, Recruiter, RIVERSIDE METHODIST HOSPITALS, 3535 Olentangy River Road, Columbus, Ohio 43214.**

Riverside promotes the hiring of nonsmokers.

RIVERSIDE METHODIST HOSPITALS

An Equal Opportunity Employer M/F/H/V

INFORMATION SYSTEMS

WAL-MART STORES, INC.

Data Base Administrators

WAL-MART STORES, INC. of Bentonville, Arkansas -- one of the nation's largest and fastest growing retail chains -- has openings for Data Base Administrators. These positions are responsible for the design, implementation, and on-going support of IMS and relational data bases.

Potential candidates must have:

- **3-5 years IMS Data Base Administration responsibilities.**
- **1-2 years relational database experience, preferably DB2.**
- **Logical and Physical Data Base Design experience.**
- **Business Communication Skills.**
- **Desire to Grow Professionally and a willingness to tackle complex business and technical problems.**

This position offers comprehensive benefits and salary commensurate with experience. All inquiries kept confidential. Relocation to NW Arkansas required. Principals only, send resume to:

Carol Taylor, Information Systems Recruiter
Wal-Mart Stores, Inc., Dept. 8053
702 Sw 8th St.
Bentonville, AR 72716-0139

Wal-Mart is an Equal Opportunity Employer

FLORIDA/CARIBBEAN
Immediate Openings

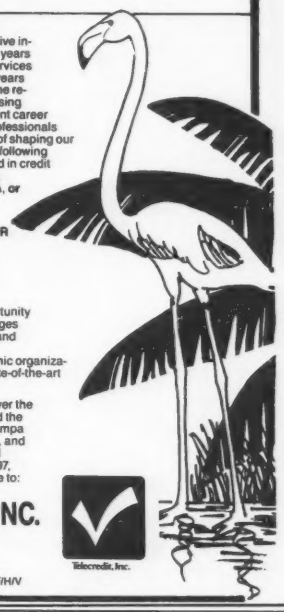
METRO, an Inc. 500 Company, offers software development and implementation services to Fortune 1000 Companies. Our benefits include 401K, Medical/Dental insurance, education & training in state-of-the-art databases.

CICS	TANDEM	MSA
DB2	IMS	MAC-PAC
M&D	HP3000	SYS/38
IDMS	UNIX C	VAX/VMS 6220

Please call or send your resume to
Brenda Fernandez.

METRO
Information Services, Inc.
5300 W. Cypress St., Ste 285
Tampa, Florida 33607
(813) 289-6955

Discover The DP Advantage In Tampa, Florida



TELECREDIT, Inc. is a progressive industry leader with more than 25 years of experience in the payment services field. Due to three consecutive years of record breaking growth and the redesign of our credit card processing system, we have several excellent career opportunities for resourceful professionals who would enjoy the challenge of shaping our future system. To qualify for the following positions, experience is required in credit card processing, COBOL/CICS, ASSEMBLER, MANTIS/SUPRA, or Relational Database/4 GL.

- **SYSTEMS ANALYST**
- **MVS SYSTEM PROGRAMMER**
- **DATA BASE ANALYST**
- **PROGRAMMER ANALYST**
- **PROJECT LEADER**

Are you TELECREDIT material? You are if you:
- Can turn challenge into opportunity
- Are ready to face new challenges
- Desire the opportunity to expand technically
- Would like to work for a dynamic organization utilizing leading edge state-of-the-art technology

With TELECREDIT you'll discover the rewards of career fulfillment and the advantages of our tantalizing Tampa lifestyle complete with sun, surf, and sandy beaches. For confidential consideration call 1-800-237-2997, Ext. 2386 or submit your resume to:

TELECREDIT, INC.
Attn: Linda Bowman
5301 W. Idlewild Ave.
Tampa, FL 33634

Telecredit, Inc.

An Equal Opportunity Employer M/F/H/V

PROGRAMMER/ ANALYSTS

Simpson Paper Company, a progressive pulp and paper manufacturer whose Corporate MIS is located in Northern California, has challenging opportunities for Programmer/Analysts. Positions will report to MIS Department, but will be located at the remote mill sites at Pomona, California and Tacoma, Washington. Duties include providing technical support, develop and implement complex computer systems and serve as liaison between the mill personnel and the MIS Department. Position requires a BS in Computer Science or Business or related equivalent work experience, several years programming and system analysis experience using RPGII. Must have extensive System 36 and PC knowledge. Requires strong interpersonal skills with ability to interact effectively with the user and work independently with a minimum of supervision. EOE M/F/H Please forward your confidential resume to Employee Relations, 1 Post St., San Francisco, CA 94104.

MSI

COMPUTER PROFESSIONALS

MSI, in response to growing client requests, is seeking ambitious DP Professionals to support our three business thrusts of:

- Data Processing Consulting
- Contract Programming
- Custom Software Development

POSITIONS TO $50,000

Most assignments are 1 to 2 years in duration and involve large IBM Mainframe, Database and Data Communications development projects utilizing leading edge software systems and 4GL's.

Send your resume to:

Management Solutions Inc.
1416 South Third Street
Louisville, KY 40208

PROGRAMMER ANALYST

Meridia Health System, Northeast Ohio's largest not-for-profit health system, seeks an experienced Programmer Analyst to join our dynamic organization. This is a challenging position at our centralized processing site that will provide ample opportunity for professional growth.

The individual we seek will be responsible for one or more application systems, their installation, as well as programming changes and enhancements. They will work in a multi-vendor shop primarily supporting applications running on our AS/400 and our distributed network of System 36s.

The qualified candidate will have an appropriate Bachelor's degree, proficiency in RPGIII and COBOL, and a minimum of three years' experience installing and supporting application packages on the System 38.

We offer a highly competitive salary and compensation package. If interested and qualified, please submit resume and salary requirements in confidence to: **Barbara Stephens, Human Resources.**

MERIDIA
HEALTH SYSTEM

Corporate Office
6700 Beta Drive
Mayfield Village, Ohio 44143

Equal Opportunity Employer

EDP AUDIT & DATA SECURITY POSITIONS

COAST TO COAST AND OVERSEAS

All positions fee paid. Also free resume preparation and career appraisal. Call (203) 421-4071 or write:

Professional Search
P.O. Box 477
Clinton, CT 06413

IDMS ADS/O
NO RESUME REQUIRED
800-874-9595

NPS
NATIONAL PROGRAMMING SERVICES, INC.

121 EXECUTIVE CENTER DRIVE ☐ SUITE 240
COLUMBIA, SC 29210 ☐ TELEPHONE 803-772-9412

Computerworld Recruitment Advertising Works.

"Computerworld is the only place we advertise."

— Peter Jozwik
President
The Search Firm
San Francisco

Peter Jozwik, President of The Search Firm, makes it clear that his company is a recruiting organization, *not* an employment agency. Recruiting firms like his locate qualified personnel to fill their clients' well-defined positions — whereas employment agencies find positions for job seekers.

The big difference, Peter explains, is the networking approach The Search Firm takes. In talking with candidates, he gains a greater understanding of the types of professionals currently in the job market — and whether they match the needs of other Search Firm clients. And to reach these professionals, he turns to *Computerworld.*

"We're looking for name recognition in the computer community. It's that simple, for the most part. We really don't advertise specific positions — just our company and our specialized services.

"And we're particular about where we advertise. Computerworld *gives us the audience that's perfect for us. We're reaching all kinds of computer professionals at companies of all sizes in just about every industry. Obviously, if you're a professional recruiter, that's just what the doctor ordered.*

"Results? Put it this way: Computerworld *is the only place we advertise. And that's a decision that keeps looking better every day. Awhile back we experimented with advertising in other publications — an experiment that proved* Computerworld *is the only vehicle for us. So for the future, I see no reason to do anything but advertise regularly in* Computerworld."

Computerworld. We're helping serious employers and qualified information systems, communications and PC professionals get together in the computer community. Every week. Just ask Peter Jozwik. For all the facts on how *Computerworld* can put you in touch with qualified personnel, call your local *Computerworld* Recruitment Advertising Sales Representative today.

COMPUTERWORLD

The weekly newspaper of record for computer professionals.

Boston: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171
(508) 879-0700

New York: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652
(201) 967-1350

Washington D.C.: 8304 Professional Hill Drive, Fairfax, VA 22031
(703) 573-4115

Chicago: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018
(312) 827-4433

Los Angeles: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714
(714) 250-0164

San Francisco: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714
(415) 322-3314

An IDG Communications Newspaper

Reading someone else's copy of Computerworld?

YES, I want to receive my own copy of COMPUTERWORLD. Please send me 51 weekly issues for only $39.00* — just 76¢ per copy. In addition, I'll receive FREE bonus issues of COMPUTERWORLD FOCUS.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Basic Rate: $48

* U.S. Only. Canada $110, Central/South America $135, Europe $195 (Airmail), all other countries $295 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   10. Manufacturer (other than computer)
   20. Finance/Insurance/Real Estate
   30. Medicine/Law/Education
   40. Wholesale/Retail/Trade
   50. Business Service (except DP)
   60. Government — State/Federal/Local
   65. Communications Systems/Public Utilities/ Transportation
   70. Mining/Construction/Petroleum/Refining/Agric.
   80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   90. Computer/Peripheral Dealer/Distributor/Retailer
   75. User: Other _____
   95. Vendor: Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   IS/MIS/DP MANAGEMENT
   19. Vice President, Asst. VP
   21. Dir., Mgr., Suprv., IS/MIS/DP Services
   22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   23. Dir., Mgr., Suprv., Analyst, of Systems
   31. Dir., Mgr., Suprv., of Programming
   32. Programmer, Methods Analyst
   35. Dir., Mgr., Suprv., OA/WP
   38. Data Comm. Network/Systems Mgt.
   OTHER COMPANY MANAGEMENT
   11. President, Owner/Partner, General Mgr.
   12. Vice President/Asst. VP
   13. Treasurer, Controller, Financial Officer
   41. Engineering, Scientific, R&D, Tech. Mgt.
   51. Sales/Mktg. Mgt.
   OTHER PROFESSIONALS
   60. Consulting Mgt.
   70. Medical, Legal, Accounting Mgt.
   80. Educators, Journalists, Librarians, Students
   90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   A. Mainframes/Supermins
   B. Minicomputers/Small Business Computers
   C. Microcomputers/Desktops
   D. Communications Systems
   E. Office Automation Systems
   F. No Computer Involvement

E4905-3

Reading someone else's copy of Computerworld?

YES, I want to receive my own copy of COMPUTERWORLD. Please send me 51 weekly issues for only $39.00* — just 76¢ per copy. In addition, I'll receive FREE bonus issues of COMPUTERWORLD FOCUS.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Basic Rate: $48

* U.S. Only. Canada $110, Central/South America $135, Europe $195 (Airmail), all other countries $295 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   10. Manufacturer (other than computer)
   20. Finance/Insurance/Real Estate
   30. Medicine/Law/Education
   40. Wholesale/Retail/Trade
   50. Business Service (except DP)
   60. Government — State/Federal/Local
   65. Communications Systems/Public Utilities/ Transportation
   70. Mining/Construction/Petroleum/Refining/Agric.
   80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   90. Computer/Peripheral Dealer/Distributor/Retailer
   75. User: Other _____
   95. Vendor: Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   IS/MIS/DP MANAGEMENT
   19. Vice President, Asst. VP
   21. Dir., Mgr., Suprv., IS/MIS/DP Services
   22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   23. Dir., Mgr., Suprv., Analyst, of Systems
   31. Dir., Mgr., Suprv., of Programming
   32. Programmer, Methods Analyst
   35. Dir., Mgr., Suprv., OA/WP
   38. Data Comm. Network/Systems Mgt.
   OTHER COMPANY MANAGEMENT
   11. President, Owner/Partner, General Mgr.
   12. Vice President/Asst. VP
   13. Treasurer, Controller, Financial Officer
   41. Engineering, Scientific, R&D, Tech. Mgt.
   51. Sales/Mktg. Mgt.
   OTHER PROFESSIONALS
   60. Consulting Mgt.
   70. Medical, Legal, Accounting Mgt.
   80. Educators, Journalists, Librarians, Students
   90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   A. Mainframes/Supermins
   B. Minicomputers/Small Business Computers
   C. Microcomputers/Desktops
   D. Communications Systems
   E. Office Automation Systems
   F. No Computer Involvement

E4905-3

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

Systems Programmer

The Wisconsin Department of Public Instruction is seeking an experienced systems programmer to install and maintain its software environment consisting of VM/SP with SSI, PROFS, DW/370, RSCS, SAS, VSE/SP, CICS, and IDMS. The hardware environment consists of dual IBM 4341, 3420, and NAS 7380.

Knowledge required: Software installation and testing techniques, IBM VM/SP and VSE/SP operating systems, troubleshooting techniques, effective use of written and oral communications. Experience with IDMS a plus. Start between $2436 and $2976 per month or more depending on qualifications plus excellent benefits. Write or call for special application materials to:

Lee W. Hill
WI Dept. of Public Instruction
P.O. Box 7841
Madison, WI 53707
(608) 266-2189

March 6 is the deadline for the receipt of completed special materials.

An Equal Opportunity Employer functioning under an affirmative action plan.

SOFTWARE/SYSTEMS

We have over 50 exclusive openings in N.Y. State for Software Engineers at all levels ranging from 35K to 100K. Requires a BSEE or BSCS (advanced degrees preferred) and 2-10 yrs+ experience in Software/Systems using C/UNIX, VAX/VMS, VAX/ULTRIX, SQL, X Window System or SUN for programs in networked computer systems, particularly in areas of insurance, banking, financial and pharmaceuticals. Interviews are being conducted **now!** Call 716-272-1617.

- Engineers 35-60K
- Project Leaders 65K
- Engineering Supervisors 70K
- Engineering Managers 80K
- Sr. Engineering Managers.. 100K

Send resume & salary to:
Joseph Vincielli
Executive Exchange
366 White Spruce Blvd.
Rochester, New York 14623

FLORIDA

PA CICS DL1	42K
PA IDMS ROSCOE	42K
PA WANG PC	42K
SECURITY ADMIN	36K
PA CICS ORDER ENTRY	45K
PA IDEAL	42K
PA DATAFLEX	26K
EDP AUDITOR	37K
SYS PROG CMS1100	42K
PERFORM ANALYST MVS	48K
PA IBM COBOL RETAIL	36K
PA C XENIX	36K
PA IBM MVS & PC	38K
PA MSA PAYROLL	40K
PA IMS PL/1	40K
PA CICS PL/1	40K
PA UNIX INFORMIX	32K
PA PCS HEALTHCARE PKG	45K
PA BURROUGHS BANKING	40K
PA VMS C	37K
PA HP3000	35K
PA IMS DB/DC	40K
PA TANDEM TAL-EFT	50K
SA COPICS	45K
PA FOCUS CMS	37K
SYS PROG MVS	55K
DBA IMS	45K
LAN DESIGN 3COM NOVELL	39K
MGR SYS DEV INSURANCE	49K
PA C DBASE	40K
INFO CTR TELAGRAPH	45K
PA CICS ASSEMBLER MVS	43K
PA CICS MVS	43K
PA IDMS ADSO	39K
PA CREDIT CARD	40K
PA FORTRAN GPG MVS	34K
PA IDMS CICS	42K
PA TANDEM SCOBOL	38K
SE UNIX C KERNEL	60K
SA BANKING LOANS	40K
PA NATURAL	38K
PA RPG SYS 38	39K
PA M&S PACKAGES	38K
SYS PROG TANDEM	65K
PA WANG VS COBOL	42K
TECH WRITER	42K
PJT LDR CICS	40K

MANY OTHER CONTRACT AND PERMANENT POSITIONS LOCAL AND NATIONWIDE

COMPUTERPEOPLE

12225 28TH St., North
ST. Petersburg, FL 33716
(813) 573-2626

2005 W. Cypress Creek Rd.
Suite 3
FL Lauderdale, FL 33309
800-777-8603
or 305-771-8603

MINISTRY OF FINANCE DATA PROCESSING UNIT

CONSULTANT SYSTEMS DEVELOPMENT OFFICER
$49,179 per year

The Data Processing Unit provides comprehensive computer services to all Departments of the Bermuda Government in the areas of manual and automated systems using both centralised as well as distributed and stand alone software and hardware.

This post is a non-established post, for a one year contract, renewable if funding is approved. The post holder must be able to work alone and/or supervise a group of analysts and programmers, to:

- Maintain and enhance existing programs.
- Develop long and short range plans.
- Develop project assessments and feasibility studies.
- Develop external and internal system designs.
- Program, test, convert, and implement systems.

Candidates must have substantial experience, at least five years, of a quality and depth which shows an ability to manage projects, processes, and personnel. In addition, experience is required in high level language programming, preferably System/38 RPG III, and experience desired in Dataflex, Lotus, and Multimate.

A degree or professional qualification in data processing or related discipline is required although emphasis will be placed upon proven work achievements and the personal qualities necessary to obtain results.

Send resumes, including place and date of birth, and names, addresses and phone numbers of former employers, to Controller, Data Processing Unit, Government Administration Building, 30 Parliament Street, Hamilton HM 12, Bermuda. Telephone inquiries to (809) 297-7733.

SR. SOFTWARE ENGINEERS

all positions involve NEW software development
2 to 8 years experience required

OPTIONS/FUTURES trading software (UNIX, C)
Mathematicians for OPTIONS/FUTURES quant research
WINDOWING Software (C on MAC or PS2)
Experienced Software Development Managers
UNIX Administrators and Kernel Specialists
CASE/CAE software (C++, SUN, APPOLLO)
UNIX SYSTEM V (Scientific Background)
MACINTOSH software (C or PASCAL)
TELECOMMUNICATIONS specialists
CONSULTING or PRE-SALES (INFORMIX or ORACLE)
MILITARY (ADA or UNIX/C)

UNIteX
575 N St Clair - Suite 1900
Chicago, IL 60611

Computer Professionals: Some people have won simply because they refused to lose.

The true measure of a man or woman is how they handle adversity in seeking their career objectives. Certainly it is easier to surrender than it is to fight...but that, obviously, does not lead to victory.

Yet the decision to fight for what you want dictates that you must have some staunch allies to help you in your battle. You'll find them at NCA. We can "give you the tools you need so you can finish the job." They are: thousands of career opportunities, thousands of client contacts (locally and nationally), skilled and experienced counselling and professional representation.

Come in. Call. Or mail your resume to the NCA firm nearest to you. No charge to you ever. Confidentiality is assured. We can advance your computer career as we have for thousands of others. You may then be moved to say, "Never has so much been owed by so many to so few."

National Computer Associates

ATLANTA: DataPro Personnel Consultants 400 Perimeter Center Terrace, Suite 650 Atlanta, GA 30346 (404) 392-4242
BALTIMORE: CIPS Inc. 6701 York Road Baltimore, MD 21212 (301) 377-0015
BOSTON: Robert Klevan & Co., Inc. P.O. Box 636 Lexington, MA 02173 (617) 861-1020
CHICAGO: Thomas Hertz & Associates 150 North Wacker Drive, Suite 1700 Chicago, IL 60606 (312) 977-1505
CINCINNATI: Task Group 7875 Reading Road Cincinnati, OH 45237 (513) 821-8275
CLEVELAND: Innovative Resources, Inc. Slatter Office Tower, Suite 426 East 12th & Euclid Cleveland, OH 44115 (216) 621-4220
COLUMBUS: Michael Thomas, Inc. 450 W. Wilson Bridge Road, Suite 340 Worthington, OH 43085 (614) 846-0926
DALLAS: DataPro Personnel Consultants, Inc. 13355 Noel Road, Suite 2001 Dallas, TX 75240 (214) 661-8600
DENVER: Abacus Consultants, Inc. 1777 South Harrison Street, Suite 404 Denver, CO 80210 (303) 759-5064
DETROIT: Electronic Systems Personnel 3000 Town Center, Suite 2580 Southfield, MI 48075 (313) 353-3580
GREENSBORO: DataMatchers P.O. Box 14548 Greensboro, NC 27415-4548 (919) 373-1461
HARTFORD: Compass Incorporated 900 Asylum Avenue Hartford, CT 06105 (203) 549-4240
HOUSTON: Career Consultants, Inc. 1960 Post Oak Boulevard, Suite 1050 Houston, TX 77056 (713) 626-4100
INDIANAPOLIS: The Consulting Forum, Inc. 11711 N. Meridian Street, Suite 200 Carmel, IN 46032 (317) 843-5585
KANSAS CITY: DP Career Associates 6405 Metcalf, Suite 502 Shawnee Mission, KS 66202 (913) 236-9288
LOS ANGELES: Supreme Resources, Inc. 22653 Pacific Coast Highway, Suite 1-106 Malibu, CA 90265 (818) 884-3000
MIAMI: Data Sciences Personnel, Inc. P.O. Box 8577 Hollywood, FL 33024 (305) 434-8112
NEW JERSEY: EDP Consultants, Inc. Chancellory Park II, Suite 350 350 N. Sunnyslope Road Brookfield, WI 53005 (414) 797-8855
MINNEAPOLIS, ST. PAUL: Electronic Systems Personnel 880 International Centre 900 2nd Avenue South Minneapolis, MN 55402 (612) 338-6714
NEW JERSEY: Systems Search 2040 Millburn Avenue Maplewood, NJ 07040 (201) 761-4400
NEW YORK: Botal Associates, Inc. 7 Dey Street, Suite 410 New York, NY 10007 (212) 227-7370
PHILADELPHIA: Systems Personnel, Inc. 115 West State Street Media, PA 19063 (215) 565-8880
PHOENIX: Professional Career Consultants 4725 North Scottsdale Road, Suite 209 Scottsdale, AZ 85251 (602) 274-6666
PITTSBURGH: KCS Computer Services, Inc. 400 Penn Center Blvd. Suite 320 Monroeville, PA 15235 (412) 823-8632
ROCHESTER: Traynor Confidential Ltd. 10 Gibbs Street, Suite 400 Rochester, NY 14604 (716) 325-6610
SAN DIEGO: Technical Directions Inc. 5005 Texas Street, Suite 304 San Diego, CA 92116 (619) 297-5611
SAN FRANCISCO: The Computer Resources Group Inc. 303 Sacramento Street San Francisco, CA 94111 (415) 398-3535
SEATTLE: Houser, Martin, Morris & Associates 110 110th Avenue N.E., C-80015 Bellevue, WA 98009 (206) 453-2700
STAMFORD: Hoo Waters Professional Recruiting 707 Summer Street Stamford, CT 06901 (203) 357-8407
SYRACUSE: CPA Associates Personnel Inc. 5790 Widewaters Parkway Dewitt, NY 13214 (315) 446-8492
WASHINGTON DC: Bill Young & Associates 8322 Professional Hill Drive Fairfax, VA 22031 (703) 573-0200
AUSTRALIA: For information, contact the NCA firm nearest to you.

UNIX DEVELOPERS

ProTec is an expanding UNIX-oriented services firm seeking software developers for long term projects in telecommunications, switching systems, databases and manufacturing. Prefer BS, MS, or PhD in Comp Sci/EE with strengths in UNIX (System V or 4.x BSD), C or Shell and appropriate applications. We are UNIX specialists offering a very competitive salary and benefits package, plus the opportunity to work with some of the best in the field.

Send Resume to:

The ProTec Group Inc.

2941 Kenny Rd., Ste. 255
Columbus, OH 43221
(614) 457-8055

Unix is a Trademark of Bell Labs

IMS/DB2

Applications Development
Programmer Analysts
Systems Analysts
Project Leaders
Data Base Analysts
Department Managers

Systems Programming

MVS/XA Systems Programmers
IMS and DB2 Systems Programmers
CICS Systems Programmers
VTAM/NCP Systems Programmers
VM Systems Programmers
DOS/VSE Systems Programmers

CREST COMPUTER CAREERS
4067 Hardwick St., Suite 142
Lakewood, CA 90712
(213) 493-1270

CONSULTANTS CONTRACTORS EMPLOYEES

Human Resources, Payroll/Personnel CICS/VSAM, DB2

Please send resume to: Integral Systems, Dept. PS, 2185 North California Blvd., Walnut Creek, CA 94596.

Principals only please. We are an equal opportunity employer.

Software Engineer (Danbury, CT)

Design, develop, and maintain UNIX, C and CAD/CAM programs. Design and develop communication protocols using token-ring networks. Also utilize PASCAL and ASSEMBLER languages operating under MS-DOS on micro and personal computers. Bachelors Degree in Computer Science/Electrical Engineering. 2 years experience doing above. 40 hr/wk. $38,000/yr. Resume to:

RCG Resources, Inc.
111 West 40th St., 28th Fl.
New York, NY 10018
Attn: Bob Beaudet

IT'S CALLED THE GOLDEN GATE FOR GOOD REASON

Systems professionals can discover career enrichment and personal satisfaction through the rewarding positions available with our prestigious clients. Logical Options and Sanderson Associates have merged forming Northern California's premier Search Firm

THE SEARCH FIRM, INC.
595 MARKET STREET, SUITE 1400, SAN FRANCISCO, CA 94105
(415) 777-3900 FAX 777-8632

COLORADO OPPORTUNITIES

CONTRACT OR PERMANENT

ADABAS/NATURAL PA's
DB2 - DB/ANALYSTS or PA's
SYSTEMS PROG's - MVS/VM
IDMS - DBA's, ANAL's or PA's
TANDEM SYSTEM PROG's
UNIX/CPA's, AS 400 PA's
ORACLE DBA's
UNIX SUN SYS. ADMIN's

If you have experience in one of the above and would like to live in the Rockies please call or send resume immediately to: Abacus Consultants, Inc., 1777 South Harrison, Suite 404, Denver, CO 80210. (303) 759-5064 or FAX (303) 759-9846.

Member NCA

Sunbelt Opportunities

CICS ProgiAnal's (MVS or DOS)	30-35K
ASSEMBLER Programmers (IBM)	29-34K
UNIVAC 1100 ProgiAnal's	30-34K
VAX/COBOL ProgiAnal's	32-36K
ADABAS/NATURAL ProgiAnal's	30-40K
TANDEM ProgiAnal's	30-36K
System 38 ProgiAnal's (RPG III)	29-36K
MAPICS ProgiAnal's (S/36 or S/38)	30-45K
IMS, DB/DC ProgiAnal's	29-36K
DB2 SQL ProgiAnal's	29-40K
ORACLE SQL ProgiAnal's	29-39K
FOCUS ProgiAnal's	29-35K
MSA ProgiAnal's or Sys. Anal's	30-40K
McCormack & Dodge ProgiAnal's	30-40K
IDMS ADSO ProgiAnal's	29-35K
Bank ProgiAnal's or Sys Anal's	30-45K
Insurance (PMS) ProgiAnal's	30-45K
Life/Comm. Life/70 ProgiAnal's	30-35K
MVS/VSA Sys Prog's	35-45K
IMS or DB2 Data Base Anal's	45-55K

Charlotte's largest executive search firm, in business since 1975, 300 affiliates. We place candidates in the Southeast and nationwide. Our client companies pay relocation and interviewing expenses, and our fees.

Corporate Personnel Consultants
3705-320 Latrobe Dr., Charlotte, NC 28211
(704) 366-1000
Attn: Rich Young, C.P.C.

Systems Analyst; 40 hrs/wk; 8:30 am-5 pm; $30,000/yr; overtime as needed, compensated at 1½/hr. Job requires: Masters degree w/major field of study computer science & 1 yr experience as programmer-analyst. Job also reqs: 1) exp. must include 1 yr. exp. using COBOL language; 2) 1 course in which system analysis & design was studied; 3) 1 grad crse. in systems programming; 4) 1 grad crse. in automata theory; & 5) 1 grad crse. in artificial language or operating systems. Job duties: Design, develop, test & implement computer systems for variety of customer projects in manufacturing industries. Confer w/project manager regarding capability of system & projected work load. Using automata theory, analyze data. Determine & plan computer & equipment layout & design. Modify existing equipment & system to improve capability & workload & to maximize effective operation. Train user. Most projects will req. use of COBOL lang. Qualified applicants should send resume & verification of reqs. to 7310 Woodward, Rm 415, Detroit MI 48202. Ref#2389. Employer Paid Ad.

SOFTWARE OPPORTUNITIES

1-800-423-5383

1989 Salary Survey

Let our National Award winning computer specialists assist you in your search. We have over 300 affiliated offices around the country ready to work for you!

LIFE INSURANCE	To $60K
UNIX INTERNALS	To $60K
SYSTEM 38	To $40K
IDMS, IMS or ADABAS	To $50K
P.A (COBOL or ALC)	To $40K
UNIX C	To $55K
MVS or VM INTERNALS	$ OPEN
ACF/VTAM/NCP	To $50K
DB2/SQL	To $60K
COBOL/CICS	To $40K
Software Engineers	To $60K
OVERSEAS	$ Open

ROBERT SHIELDS & ASSOCIATES
P.O. Box 890723, Dept. C
Houston, Texas 77289-0723

The Time is Right To Talk To GE Consulting

GE Consulting has a lot to talk about. We're a company on the move one with a story we'd like to tell. And we want to make it easy for you to learn more about us and our opportunities. Your career succeeds on the opportunities you've prepared for recognized and responded to.

Our Clients

At GE Consulting Services, our 1500+ professionals work with client systems management, technical experts and users to build systems and solve problems for our impressive client list of America's most prestigious names in the industry, a high-profile, high-growth member of the General Electric corporate family.

Our Opportunities

Immediate openings exist in our NE Regional Office - Albany/Schnectady.

Upstate NY
The Adirondack Mountains
The CAPITAL DISTRICT

We offer affordable suburban living with a closeness to Boston, New York City and Montreal. Our attractive location puts you near breathtaking landscapes, year-round recreation, and is a major center for technology, education and the arts.

Immediate openings exist for individuals with 2+ years in any of the following:

IBM MAINFRAME	MINI/MICRO
IMS/DB/DC, DLI	Honeywell DPS
IDMS ADS/O	DEC VAX
CICS	UNIX C
(COPICS a real plus)	

GE Consulting Services offers substantial opportunity for career advancement, excellent salaries & benefits that include paid medical/dental, life insurance, paid education and training, paid tuition reimbursement & GE product discount.

Lynne Mendelson,
Technical Recruiting Manager
17 Computer Drive West
Albany, NY 12205
(518) 454-2457

An Equal Opportunity Employer
GE Consulting Services

In an industry as dynamic and fast-paced as information technology, it takes real commitment to be the world's premier source of information services on information technology. At IDG that commitment is reflected in the kinds of challenging and rewarding careers that help our people reach their greatest potential.

Join us and make a commitment to an exciting future.

Computer System Operator

And you can be part of that team. The MIS department within IDG has an opening for a Computer System Operator.

This position will report to IDG's Information Systems Manager. The responsibilities will include: providing daily backups, generating and distributing reports, scheduling work flow, helping users, investigating problems, keeping track of computer-related supplies, monitoring system, miscellaneous tasks involving hardware and software installations/upgrades and any other duties associated with the operation of IDG's data center as assigned by the Information Systems Manager.

The ideal candidate must have minimum 1½ years experience in VAX/VMS computer operations, excellent communications skills, both oral and written, the ability to work well under pressure and with little or no supervision, and have the ability to learn quickly. To qualify you must be aggressive, capable ("can-do" attitude), ambitious, flexible and organized, and have outstanding personal and employment references. Must work second shift (4 pm - 12 midnight).

We offer an exceptional benefits package including participation in our Employee Stock Ownership Plan.

If you are interested, please send your resume to Mary Cometta, Human Resources, IDG, 5 Speen St., Framingham, MA 01701 EOE M/F

IDG COMMUNICATIONS

Answers for the Information Age.

ORGANON TEKNIKA

WHERE RESEARCH AND REALITY MERGE

As the American subsidiary of Akzo, a 7.2 billion dollar international corporation, Organon Teknika's philosophy has been that innovative technological breakthroughs are only relevant if they provide practical solutions to real needs. Implementing this philosophy has resulted in an impressive number of biomedical "firsts" and equally impressive worldwide market shares in a broad range of healthcare product areas. Leading edge research. Real solutions to worldwide health challenges. An exciting combination that's missing only one thing—you.

Programmer/Analyst

As a key member of our MIS Department, you'll write programs and detailed specifications, develop and maintain software modifications, and work closely with users in order to determine their needs, resolve problems and continue to expand your knowledge of programming and data processing.

To qualify, you'll need a college degree in a technical or business discipline and a minimum of two years' programming experience in a commercial VAX/VMS environment. Experience in Fortran, DBMS, other third generation languages and Datatrieve is required; ASK/MANMAN experience is desirable.

In addition to an excellent salary and benefits package, we offer a creative, innovative and supportive work environment with lots of advancement potential in our new Treyburn headquarters. **Please send your resume to: Human Resources Department, Organon Teknika Corporation, 100 Akzo Avenue, Durham, NC 27704.** An Equal Opportunity Employer M/F/H/V.

AKZO ORGANON TEKNIKA

It's easy to place your recruitment ad in Computerworld!

All the information you need is right here. Just call Lisa McGrath at 800-343-6474 (in MA, 508-879-0700). Or, if you want, you can send us the form below via mail or to our FAX machine. You can reach our FAX at ext. 739 or 740 at either of the above numbers.

The following information will help you determine the size ad you'd like to run and when you'd like to run it.

CLOSING DATES: To reserve space, you need to call us by 5PM (all continental U.S. time zones), 6 days prior to the Monday issue date. We need your ad materials (camera-ready mechanical or copy for pub-set ad) by 5PM, 5 days prior to the weekly issue.

AD COPY: We'll typeset your ad at no extra charge. You can give us copy via phone, U.S. mail, or FAX. To typeset an ad for you, we need clean, typewritten copy. Figure about 30 words to the column inch, not including headlines. (There are seven columns on each page.)

LOGOS AND SPECIAL ARTWORK: Any logos or special artwork should be enclosed with your ad copy. For best reproduction, please send us either a stat of your logo or a clean sample on white bond paper.

COLUMN WIDTHS AND MINIMUM DEPTHS: Your ad can be one of seven different widths. There is a minimum depth requirement for each width. You can also run larger ads in half-inch increments. The chart below can serve as a reference.

NUMBER OF COLUMNS	WIDTH	MINIMUM DEPTH
1 column	1-1/4"	2"
2 columns	2-5/8"	2"
3 columns	4-1/16"	3"
4 columns	5-9/16"	4"
5 columns	6-15/16"	5"
6 columns	8-3/8"	6"
7 columns	9-3/4"	7"

RATES: Your rate will depend on the size of your ad and whether you choose to run regionally or nationally. The national rate is $13.50 per line or $189.00 per column inch. The regional rate (Eastern, Midwestern or Western editions) is $9.00 per line or $126.00 per column inch. You can run your ad in any two regions for $11.60 per line or $162.40 per column inch. In all cases, you can earn volume discounts.

The minimum ad size is two column inches (1-1/4" wide by 2" deep) and costs $378.00 if run nationally. A sample of this size appears below. You can run larger ads in half-inch increments at $94.50 per half inch. Box numbers are available and cost $25 per insertion ($50 if foreign).

Programmer Analyst

This is a sample ad for Computerworld's Computer Careers section. It will help you decide what size ad you'd like to run. Remember that you can run your ad either regionally or nationally in our recruitment section and that the minimum ad size is one column (1-4/16 inches wide) by two inches deep (like this sample). This ad would cost $378.00 in our national edition, $252.00 in the Eastern, Midwestern, or Western edition, and $324.80 in two regions; volume discounts apply.

SAMPLE AD SIZES AND PRICES: To assist you in planning your recruitment advertising, the following shows common ad sizes and their respective costs.

	One Region (East, Midwest or West)	*Two Regions (East/West East/Midwest, Midwest/West)*	*National Edition*
1 column x 2"	$ 252.00	$ 324.80	$ 378.00
2 columns x 2"	$ 504.00	$ 649.60	$ 756.00
3 columns x 3"	$1,134.00	$1,461.60	$1,701.00
4 columns x 5"	$2,520.00	$3,248.00	$3,780.00
5 columns x 7"	$4,410.00	$5,684.00	$6,615.00

PAYMENT: If you're a first-time advertiser or if you haven't established an account with us, we need your payment in advance (or with your ad) or a purchase order number. Once you have established an account with us, we'll bill you for any ads you run as long as your payment record is good.

COMPUTER CAREERS NETWORK BUYS: You can take advantage of special rates that let you run your ad in *Computerworld* and *Computerworld*'s sister newspapers at special rates. Choose from *Computerworld Focus on Integration, Network World, InfoWorld, Digital News and Federal Computer Week. Call for details.*

Computerworld Recruitment Advertising Order Form

Ad Size: _____ columns wide by _____ inches deep

Issue Date(s): _____

Name: _____

Company: _____

Address: _____

Telephone: _____

Region: ☐ East ☐ Midwest ☐ West **National:** ☐
☐ East/Midwest ☐ Midwest/West ☐ East/West

Send this form to: **COMPUTERWORLD RECRUITMENT ADVERTISING**
375 Cochituate Road, Box 9171, Framingham, MA 01701-9171
800-343-6474 (In MA, 508-879-0700)
Telecopier Extensions: 739 or 740

MARKETPLACE

It's a do-or-don't year for HP

End users waiting to see direction of Spectrum series

BY HANS MARQUARDT
IDC FINANCIAL SERVICES CORP.

Hewlett-Packard Co. continues to experience complications with its commercial processor offerings that are confusing potential buyers about its future directions.

Hewlett-Packard's 3000 Model 930 and Model 950 minicomputers were announced in March 1986. They utilize a 32 bit/sec. reduced instruction set computing (RISC) architecture and are known throughout the industry as the Spectrum series. The 3000 Model 930 was scheduled to ship by the end of 1986, and the 3000 Model 950 was slated for shipment in the middle of 1987. By January 1988, only a few of these processors were shipped. Thus, it was evident that earlier rumors of software problems on the proprietary MPE-XL operating system had been correct.

In April 1988, HP announced additional models: a high-end 3000 Model 955 offering more power than the Model 950, a Model 935 that replaced the troubled Model 930 and two smaller versions, Models 925 and 925LX.

However, the problems with the MPE-XL operating system continued to plague HP. The processors would not perform up to their expected levels, and the migration from the older 3000 line, which had been anticipated as an easy move, was turning into a difficult one.

Wait and see

Last August, HP finally delivered MPE-XL Version 1.1 to replace the original Version 1.0. Industry sources indicated that the new operating system increased performance by 20% to 30%. But migration to the Spectrum series has been slow because clients are taking a wait-and-see approach. Industry sources and HP said that the next version of MPE-XL is on schedule for release in the first quarter of 1989.

Expectations for Spectrum must be made clear if HP intends to get any new clients on the commercial side because the company can not grow in market share against the likes of IBM and Digital Equipment Corp. with the older 16 bit/sec. 3000 line.

In the used-equipment market, the confusion caused by the Spectrum series has allowed HP equipment to flourish. It is a market that has been estimated to be half-owned by HP's Finance and Remarketing Division (FRD) and half owned by approximately 20 independent dealers and brokers.

For the most part, HP's FRD focuses on the large users that it feels the independent dealers will not go after. However, there have been a number of situations in which the competition has become heated.

The high end of the older HP 3000 line is the Model 70. Demand for this model continues to be strong. Smaller shops are bringing in the Model 70s to replace their lower-end models while some larger shops are doubling up on the Model 70s instead of purchasing a Model 950.

For users who want to buy a new Model 950, HP is offering an upgrade credit of $120,000 toward a Model 950 in return for a user's Model 70. According to Leasing Planning Service, this upgrade credit may drop as low as $80,000 early this year.

HP has kept a fairly tight grip on the 3000 Model 58 market. If a user is interested in upgrading from a smaller 3000 series to a Model 58-level processor, HP will offer a discount. In most cases it is an easy board swap to upgrade. There is also an upgrade credit available to go from the Model 58 to a Model 950, although it is much less than the one offered for the Model 70. The 3000 Model 52 performs slightly under the level of a Model 58. The Model 52 trades for $2,000 to $3,000 less on the used market.

Presently, the Model 48 is a good deal for an end user looking to purchase a system of this size. Supply is ample, and dealers are practically giving them away.

The older 3000 line is rounded out at the bottom by the Models 44, 42 and 39. These models are now bought and sold for parts. The parts are useful to maintain other HP processors and in some cases can be used to repair equipment that is involved in disaster recovery.

HP has many fine computer products and has proven that it's RISC architecture can work well when performing scientific and engineering applications. The evolution of its commercial processors and the MPE-XL strategy must be made more clear, and announcement dates must be met if HP wants to become more prominent in the minicomputer market.

For more information, contact IDC Financial Services Corp.'s Terri LeBlanc at 508-872-8200.

Hewlett-Packard

Current fair market values

Model	Date shipped	Retail used market values
3000-70	March 1986	$103,000
3000-68	December '83	$65,000
3000-64	March '82	Not trading
3000-58	August '85	$27,000
3000-52	September '86	$23,200
3000-48	December '83	$5,900

SOURCE: IDC FINANCIAL SERVICES CORP.
CW CHART

Index

Marketplace 75
Used/Lease/Rent 75
Hardware 80
Software 80
Peripherals/Supplies 80
Graphics/Desk Top Pub 80
Time/Services 79
Bids/Proposals/Real Estate 80
Business Opportunities 80
Training 81

The BoCoEx index on used computers

Closing prices report for the week ending Jan. 20, 1989

	Closing price	Recent high	Recent low
IBM PC Model 076	$750	$875	$400
XT Model 086	$1,150	$1,250	$900
XT Model 089	$1,225	$1,575	$1,050
AT Model 099	$1,675	$2,400	$1,525
AT Model 239	$1,925	$2,900	$1,800
AT Model 339	$2,000	$3,600	$1,800
PS/2 Model 30	$1,500	$1,700	$1,300
PS/2 Model 50	$2,350	$2,600	$1,900
Compaq Portable I	$675	$975	$600
Portable II	$2,000	$2,100	$1,750
Portable III	$2,900	$3,175	$2,500
Portable 286	$1,750	$1,975	$1,675
Plus	$1,100	$1,250	$900
Deskpro 286	$2,200	$2,350	$1,800
Deskpro 386	$3,800	$3,975	$3,675
Apple Macintosh 512	$650	$950	$550
512E	$875	$975	$700
Plus	$1,050	$1,200	$900
II	$4,300	$5,100	$3,800
Toshiba T1000	$650	$825	$600
Toshiba T3100	$2,300	$2,500	$2,000

INFORMATION PROVIDED BY THE BOSTON COMPUTER EXCHANGE CORP.

Used/Lease/Rent

Reconditioned digital™ Equipment

Whatever your requirements are for Digital Equipment, call CSI *first!* Buying, selling, trading, leasing, consignments - we do it all!

CSI sells all equipment with a 30 day unconditional guarantee on parts and labor and is ***eligible for DEC maintenance.***

Offering systems, disk drives, tape drives, printers, terminals, memory, options, boards, upgrades and many more.

CSI Compurex Systems, Inc.
75 Toeca Dr. Stoughton, MA 02072
CALL TOLL-FREE 1-800-426-5499
In Mass. (617) 344-9900
FAX (617) 344-4199

SELLING A DATA CENTER?
Or Computer Equipment?
Call Bencom it's our Specialty

Highest Prices Paid - Fast & Professional

* Systems PC's to Mainframes - All Brands
* CRT's and Printers - All Brands
* Communications Equipment - All Brands
* Cabling, Flooring and Cooling Systems
* One or Multiple Locations
* Liquidations

February Special - Computer raised flooring starting at $6.00 per sq. foot.

BENCOM MARKETING 306 El Norte Parkway Escondido, CA 92026 (619) 480-7400

SALE OR LEASE

4381-P14,R24 3370 3375
3880-001 5360-824
CALL DON SCHIELTZ

MCDONNELL DOUGLAS CAPITAL CORPORATION

(313) 641-9797

We Buy & Sell DEC
Systems
Components

Digital Computer Resale
call:713 445-0082
600 Kenrick Ste C22 Houston, Tx 77060

DEC VAX & AT&T
BUY-SELL-NEW-USED
Systems, Peripherals, Options available for sale
Looking to purchase VAX and AT&T Systems, Hardware
LAKEWOOD COMPUTER CORP.
438 Link Lane Ft. Collins, CO 80524
(303) 493-6406 FAX:(303) 493-6409
dda

Used/Lease/Rent

IBM 4300 SERIES 1 SYSTEM AS/400 SYSTEM 36/38

MEMBER OF CDLA

*SPECIAL LEASE RATES ON NEW AS/400's

• Buy • Sell • Lease • Trade • New • Used

• IBM Warranty/IBM Maintenance Guaranteed • Disk • Terminals

• Flexible Lease Options Tailored to Your Needs • Printers • Tape

MEMBER OF WAEL

• Equipment Configured To Your Requirements • All CPU Upgrades

NEWPORT LEASING, INC.

800-6789-IBM*

2 Faraday, Irvine, CA 92718

714/770-2122

FAX: 714/770-5441

IBM is a registered trademark of International Business Machines Inc.

RT
937X
Series/1
AS/400
System 36, 38
4300

Buy, Sell, Lease, Rent

612•942-9830

All IBM Machines and Parts

DATATREND, Inc.
10250 Valley View Road
Suite 149
Eden Prairie, Minnesota 55344

PRIME

EXPERIENCED SYSTEMS AND PERIPHERALS

BUY-SELL-LEASE-BROKERAGE

NEW PLUG-COMPATIBLE DISK, TAPE, MEMORY

PLUS
THE FASTEST I/O AVAILABLE ANYWHERE

1ST SOLUTIONS, INC
11460 N CAVE CREEK ROAD
PHOENIX, AZ 85020
602-997-0997
ASK FOR DON SHIFRIS

• Buy • Sell • Lease • Rent

IBM Displaywriters

5525 — OFFICE SYSTEMS

5219 — 5253 — 5258

6670 PRINTERS

SYSTEM/34/36

CDB FINANCIAL, INC.

3520 DILIDO ROAD
DALLAS, TEXAS 75228
800-648-6791
214-324-3491
Member CDLA

NEW
IBM 9370

9375 Central processor 8MB
(4) 9335 disk drives (B) - 3 gigabytes
(2) 9335 disk controllers (A)
(2) 9309 racks (CPU and disk)
4245 printer - 2000 LPM
(5) 3299 terminal multi plexor
(36) 3191 CRT terminals
(2) 3420 tape drives
3803 tape controller

Under IBM Maintenance
Available Immediately
(404) 955-5525

BUY OR SELL
NEW OR USED

IBM PC * XT * AT * PS/2
COMPAQ * HP * AT&T * WANG
MACINTOSH * APPLE 2

1-800-262-6399

Boston
Computer
Exchange
Corporation
MA 617-542-4414
FAX 617-542-8849

WANG

Buy-Sell or Trade

VS PC MVP OIS

Systems In Inventory
VS 7150 / 100 / 85 / 65 / 6 / 5

And Peripherals
4230A • 4230 • LPS-8 • 2256C
PC/AT *WORKSTATIONS

Genesis Equipment Marketing

Phone (602) 277-8230
Fax (602) 234-0613

* AT is a registered trademark of I.B.M.

NORTHEAST MINICOMPUTER, INC.
55 High Street, Unit 6
Billerica, MA 01862

Wants to Buy Your Surplus DEC Computer Equipment

We Pay Cash for Your Unwanted Computer, Peripherals, Options, Memory, and Terminals.

Call 1-800-343-8302
or in Mass.
1-508-663-2550.
Or Fax Your List
1-508-667-0718

Turn Your excess inventory into Cash $$$$

dda

IBM
BUY • SELL • LEASE
CDLA

AS/400
S/3X
S/1 POS
PARTS

AMCOM CORPORATION

800-328-7723
612-829-7445
5555 WEST 78TH STREET
MINNEAPOLIS, MN 55435

WANTED

OBSOLETE AND EXCESS COMPUTER EQUIPMENT

Top Cash Paid

We purchase all types of obsolete or excess computer equipment and peripherals. We pay costs for all shipments as well as top prices.

Call today for a quote on your system.

COMPU-SCRAP, Inc.
Randolph, MA 02368
(617) 341-2695
Call Collect!

DEC - IBM
BUY / SELL

VAXs
MICROVAX II, III SYSTEMS
IBM S/36, S/38, 30XX, 43XX
PERIPHERALS
IBM XT, AT
ALL MICROS
IBM AT 339s (New & Refurb)
IBM 3174 51Rs (New & Refurb)
ALL KEY, PBX & Telecom EQPT.
Need IBM 4381-P02 (NOW)

LINK PROCESSOR

603 E. Town St.
Columbus, OH 43215
Phone: 614-464-1638
FAX: 614-239-8386

Go Shopping in...
Computerworld's Classified
MARKETPLACE
Call for all the details
(800) 343-6474
or Fax your ad to: (508) 620-7736

"Our business has increased by 30% a month since we started advertising in Computerworld Marketplace."

— Joseph Sestito
President
Tridex Corporation

"Our goal in advertising is to generate quality leads. We want to hear from decision makers and people who do the buying at user organizations. I know, after 11 years in the business, that *Computerworld* is the leader when it comes to delivering those decision makers. In short, we expected high-quality response from *Computerworld* - and that's exactly what we got."

Computerworld Classified Marketplace. We're helping more computer professionals buy, sell and lease products and services. We're the choice of Tridex Corporation. And we can be your choice as well.

COMPUTERWORLD
CLASSIFIED MARKETPLACE
Where all computer buyers and sellers can go to market.

Computerworld is an IDG Communications Newspaper

Used/Lease/Rent

BUY, SELL LEASE IBM CPU's

3081's, 3083's, 3084-QXX, 3090
PILLAR SILENT BLOCK, PARALLEL CABINET
GTEX Financial Group
(214) 783-1212
CDLA Est. 1978

minicomputer exchange
since 1973
BUY • SELL
BROKER • SERVICE
sun microsystems
DEC
DG
Computers • Systems Peripherals
CAD/CAE Equipment
Call 408-733-4400
FAX: 408-733-8009

IBM BUY · SELL · LEASE
Member Computer Dealers & Lessors Association
CDLA
SYSTEM 36/38
AS/400
43XX 30XX
SERIES 1
AT&T VOICE SYSTEMS
• Processors
• Peripherals
• Upgrades
DEMPSEY & ASSOCIATES
18377 Beach Blvd., Suite 323
Huntington Beach, CA 92648 (714) 847-8486
(800) 888-2000

BURROUGHS UNISYS
B20 - B7000
A Series - V Series
All Peripherals
Low Lease Rates
Depot Maintenance
LDI/ COMPUTER PROVISIONS CORPORATION
(216) 687-0307

HEWLETT · PACKARD
1000 • 3000 • 9000
Computers • Peripherals
Terminals
Buy • Sell • Rent • Lease
EURODATA INC.
2574 Sheffield Road
Ottawa, Canada K1B 3V7
613-745-0921
FAX: 613-745-1172

HONEYWELL
LEVEL 6 DPS 6 SERIES 16
• Complete Minicomputer Line New & Used
• All Peripherals and Terminals
• Upgrades and Features
• Depot Repair Capability
• Honeywell Maintenance Guaranteed
• Immediate Delivery Low Prices
• HDS 5 and HDS 7 Compatible Terminals
The Recognized Leader in Honeywell Minicomputer Sales and Support
BCS
BOUDREAU COMPUTER SERVICES
100 Bearfoot Road
Northboro, MA 01532
(508) 393-6839
FAX 508-393-3781

We buy, sell, lease & rent quality new and used equipment. And we stand behind it for a year.
digital

SA482-AA (New) 2.488 GB Storage Array $50,000.00	LP25-AA 285 LPM Band Printer $595.00 LP25-BA 285/204 LPM 64/96 Character Band Printer $695.00	RA81-AA 456 MB Winchester Disk Drive $5,995.00
Long and Short Term Leases and Rentals Available CALL...	DV-350-T1-AA MV 3500 $72,500.00 DV-360-T1-AA MV 3600 $ 98,200.00	We Pay Cash for New, Used and Obsolete Surplus DEC Equipment
Wanted Sun Microsystem Computer Equipment, any System, any Configuration	RA82-AA 622 MB Winchester Disk Drive $12,395.00	PDP 11/23 11/24 11/73 11/83 11/84 All Configured to Your Needs....

TRIDEX CORPORATION
Phone: 603-886-0383
Fax: 603-886-0914
375A WEST HOLLIS ST. NASHUA, NH 03061

Your Used computer equipment deserves a second chance.

If you have used computer equipment to sell, *Computerworld's* Classified Marketplace is the best place to do your selling. That's because the Classified Marketplace features a Used/Lease/Rent section to help you market your equipment to the very people who are looking to buy.

And when you advertise in *Computerworld* Classified Marketplace, you reach a total (ABC-audited) audience of over 612,000 computer professionals who turn to *Computerworld* for news, information, features - and the Classified Marketplace - every week.

So give your used computer equipment a second chance today. Call 800/343-6474 (in MA, 508/879-0700) to reserve your space.

COMPUTERWORLD CLASSIFIED MARKETPLACE
Where all computer buyers and sellers can go to market.

PRIME
Surplus Sale
9955 CPU $40,000 or offer
CDC 9775 675mb $1,500.
Telex GCR tri-density $10,000.
1,000 LPM data printer $2,000.
600 LPM data products $2,500.
Terminals - PT200, PST100, Wise 50, 60 Call
Special Tab ASCII terminals $75. each
ICS 32 ports $6,000.
(409) 842-9355

TROY CFO 10 CHECK PRINTER
4 Years Old
Low Usage
Complete maintenance history
(415) 863-2929
Richard Fowles

FOR SALE BY END USER
HP 1000

Equipment	Installed	Qty.
HEWLETT PACKARD 1000 "E" SERIES 5402 Processor 1.1 M.B. Memory	7/83	1
HP 7925 120 MB Disk Drive	7/83	2
HP 7906 20 MB Disk Drive	7/83	1
HP 2621 Screen	7/83	4
HP 2645 A Screen	7/83	1
HP 2623 Screen	1/84	1
HP 2631B Printer 180 cps.	7/83	3

Contact: NATIONAL PETROLEUM CONSTRUCTION COMPANY
ABU DHABI U.A.E.
Procurement Superintendent
Tel. no. (009712) 578700
Telex no. 23807 NPCC EM
Fax no. (009712) 578 165

Used/Lease/Rent

CALL US LAST

GET YOUR BEST PRICE
Then Call
SPECTRA PRODUCTS, INC.
For The Best DEAL
WE
Buy - Sell - Lease - Rent
IBM and DEC™ SYSTEMS
NEW and USED
Other Services Available
Installation and Maintenance
Contract Programming

Call 800-238-6405
IN TN 901-754-6500
SPECTRA PRODUCTS, INC.
1669 KIRBY PKWY. MEMPHIS, TN 38119
"SINCE 1974"
Formerly Computer Brokers, Inc.

IBM SPECIALISTS

SELL • LEASE • BUY
S/34 S/36 S/38 AS/400
3741 3742

- New and Used
- All Peripherals
- Upgrades and Features
- IBM Maintenance Guaranteed
- Immediate Delivery
- Completely Refurbished

800-251-2670
IN TENNESSEE (615) 847-4031

CMA COMPUTER MARKETING of America, Inc.
PO BOX 71 • 610 BRYAN STREET • OLD HICKORY, TENNESSEE 37138

WANT TO BUY

XEROX 4050
Laser Printer
Contact Wayne Smith
(402) 397-2885

FOR SALE

FRONT-END PROCESSOR
NCR COMTEN
MODEL 3695
• 2MB MEMORY
• 40 LINES, CONSOLE, HARD DRIVE
3725 COMPATIBLE,
WITH MORE POWER
Contact Fred Willis
(213) 446-6309

FOR SALE

NEW AS/400's
All Models
Terminals, Printers, Disk Drives
3196, 3197, 4224, 4234, 9332, 9335
IMMEDIATE DELIVERY
Call Paul Britton
RALION SYSTEMS, INC.
10 Sasco Hill Road
Fairfield, CT 06430
(203) 255-5968

VAX RENTALS

MV 3500/3600
MICROVAX II
VAX 6000 SERIES
VAX 8000 SERIES
Systems & Peripherals

- Fast Turnaround
- Dependable Products
- Upgrade/Add-On Flexibility

6 Months • 12 Months • 36 Months
BROOKVALE ASSOCIATES
dba Digital Dealers Association
(516) 273-7777 (206) 392-9878

IF YOU'RE BUYING, WE'RE SELLING

IF YOU'RE SELLING, WE'RE BUYING
IBM SYSTEMS
Buy • Sell • Lease PERIPHERALS
(800) 331-8283
TOLL FREE
(213) 394-1561
CALIFORNIA
Ocean Computers, Inc.
919 Santa Monica Blvd., Ste. 200
Santa Monica, CA 90401
CDLA

BE Associates inc.

- Data General
- Fujitsu
- Data Products
- CDC
- Printronix
- Zetaco

BUY SELL TRADE
(617) 982-9664
FAX: (617) 871-4456

DEC PDP-11

BUY & SELL
SYSTEMS & PERIPHERALS
THE One-Stop EXCHANGE!
• CPUS • TERMINALS
• DISC DRIVES • PRINTERS
• INTERFACES, ETC.
dce DIGITAL COMPUTER EXCHANGE INC
Call (415) 887-3100

IBM Unit Record Equipment

Data Modules/Disk Packs
Magnetic Tape/Diskettes

029-082-083-084-085-088
129-514-519-548-557-188
2316-3336(1)&(11)-3348(70)
80-200-300 MB
Disk Packs

Thomas Computer Corp.
8608 W. Howard Chicago IL 60648
800-621-3008 312-647-0880

It's the CLASSIFIED MARKETPLACE

Reach Information Systems Professionals Where They Shop For:

- ☐ Used/Lease/Rent
- ☐ Hardware
- ☐ Software
- ☐ Peripherals/ Supplies
- ☐ Communications
- ☐ Graphics/Desktop Publishing
- ☐ Time/Services
- ☐ Bids/Proposals/ Real Estate
- ☐ Business Opportunities

CALL NOW
(800) 343-6474
(In MA., (508) 879-0700)

WANT TO BUY

3720'S • 3725'S

FOR SALE

3720's • 3725's • 3745's

DDC Communication Controller Specialists

Distinctive Dataprocessing Consultants, Inc.

Call us for a quote on your features, upgrades, and line sets!
(214) 869-2214
FAX 214-869-1589

LaSalle Computer Corporation

T-BAR SWITCH
12x12
Available Now
For Sale or Lease
For more information
Call Betsy Shields
312-967-1750
CDLA Member Computer Dealers & Lessors Association

BUY * SELL * RENT * LEASE

3178	3174	3262
3179	3274	3268
3180	3276	3287
3191	3278	4224
3192	3279	4234

Large inventory. Quick delivery. Most models and features in stock. All machines refurbished.

URS
URS Information Systems, Inc.
One Pope Street
Wakefield, Ma. 01880
617-438-4300
ABAM Member

AS/400 S/38 S/36 S/34 SERIES 1

BUY - SELL LEASE
Systems, Peripherals Upgrades
Source Data Products Inc.
969C Industrial Road
San Carlos, CA 94070
1-800-333-2669
415/595-7791

PARADYNE MODEMS

For Sale
MPX - 4800
(quan. avail. - 760)
PDN - 3430
(quan. avail. - 230)
Upgradable to 9600 Baud
Modems have diagnostic card and DCAA dial backup feature
Garry Cloyd
Norwest Financial
(515) 247-7339

IBM

9/36	5382-9Q1, w/8mb Main Memory 4 Comm. lines, Support 64 Local W/S's, 1 Int. 62 pc. Disk Drive, CPF R8.0 Op. Sys.
3370	DASD, Model A11-571.3mb w/built-in controller Model B12's (2), w/729.8mb ea. TOTAL DASD CAPACITY 2030.9mb
3262	Printer Model 201, 650 LPM
3411	Tape Mdl 003, 80lbs Data Transfer at 1600 bpe tape density.
O	Direct Sale via Sealed Bid, estimate date mid-February 1989
O	Call for Bid Documents or information.

METRO-DADE COUNTY, Miami, FL
Contact: T. Rudolph (305) 594-5788

COMPUTERWORLD CLASSIFIED MARKETPLACE
Where all computer buyers and sellers can go to market.

Time/Services

NEW!
IBM MVS-ESA Test and Development Center

- IBM 3090/300E - PR/SM
- IBM 3090/120E - Standalone
- Destructive Testing
- Major Databases - DB2, IMS
- Worldwide Network
- Early Release Site

Remote Computing Services
24 Hours/
7 days a Week

- Dual 3090s - MVS/XA, VM/XA
- DEC-VAX, Wang/VS, HP3000
- Extensive Software Available
- Application Proc'ing
- Cost Effective

INET
INFORMATION NETWORK CORPORATION
For More Information And Pricing Call
1-800-222-1590, Ext 372

NJECN is a full service vendor who provides solutions to problems in technology and information resources.

MACHINE SERVICES

NJECN's state-of-the-art technical environment (available 24 hours a day, 7 days a week) can be accessed from terminals or personal computers in your home or office.

Processors:
IBM 4381, 3090

Operating Systems:
MVS/XA, VM/SP, DOS/VSE

System Software:
ROSCOE, VM/CMS, TSO/ISPF, IDMS/R, CICS, SAS, FOCUS, SPSS, Compilers

Telecommunications:
Async, Bisync, SDLC, SNA, X.25, TCP/IP

CONSULTING SERVICES

NJECN provides high quality consulting services in the areas of communications, systems, and management issues, including:

Local/Wide Area Networks
RFP Preparation/Bid Analysis
Applications Development
Communications, Planning
IDMS, CICS, MVS/XA, and VM/SP

Use of our system is cost effective because you pay only for the computer resources actually used but you have the capability to grow as your data processing requirements change.

For more information, please contact our Sales and Marketing Department.

3000 Park Ave., Edison, NJ 08820
(201) 549-8700

MIS
SUCCESS WITHOUT STRESS

NATIONWIDE REMOTE COMPUTING SERVICES

- Fixed Price Computing
- Remote Facilities Management
- General Time-sharing Services
- Image/Forms Design and Laser Printing
- Integrated Financial Applications
- Major Third Party Software Packages
- Micro/Mainframe Applications
- Nationwide Network
- Operating System Conversions
- Overflow Processing

DATA CENTERS:
Boston, MA
Los Angeles, CA
Washington, DC

CALL 1 800 PLAN LCS
1 800 752-6527

Litton
Computer Services

COMPUTING SERVICES

MVS/XA VM/370
DOS/VSE CICS
TSO CMS
DB2 IMS/DBDC
4GL SAS

MULTIPLE CPUs - 50+ MIPS

TELENET, TYMNET

IBM INFORMATION NETWORK

DEDICATED SYSTEMS AVAILABLE

GIS
INFORMATION SYSTEMS, INC.
815 COMMERCE DRIVE
OAK BROOK, IL 60521
312-574-3636

COST-EFFECTIVE COMPUTING SERVICES for TODAY and ... TOMORROW

OUR MODERN DATA CENTER provides you with low-cost, state-of-the-art computing services.

- IBM® CPUs and Peripherals
- Systems Software: MVS/XA, TSO/E, ISPF/PDF, CICS, VM/XA, VM/SP, HPO, CMS
- Application Software: Database Management, Application Development, 4/GLs, Statistical Analysis, Graphics
- Multiple Communications Methods
- Technical Support
- Pricing to fit your needs

IBM is a registered trademark of International Business Machines Corporation

For more information
Call Jeff Daum
201-896-2030

Or Write
Jeff Daum,
Vice-President
P.O. Box 26
Carlstadt, NJ 07072

Advertise Your Products In The CLASSIFIED MARKETPLACE

Featuring:

- ☐ Used/Lease/Rent
- ☐ Hardware
- ☐ Software
- ☐ Peripherals/Supplies
- ☐ Business Opportunities
- ☐ Communications
- ☐ Graphics/Desktop Publishing
- ☐ Time/Services
- ☐ Bids/Proposals/Real Estate

Reach over 612,000 Information Systems Professionals by placing your ad in the MARKETPLACE.

Name:
Title:
Company:
Address:
City:
State: Zip:

☐ I am enclosing ad material with this form.

Ad size:

_____ columns wide x _____ inches deep.

Return this form and advertising material to:

Computerworld
Classified
Marketplace
375 Cochituate Road, Box 9171
Framingham, MA 01701-9171
(800) 343-6474
(In MA., (508) (879-0700)

NOTECH
Innovative Computer Techniques
COMPUTER SERVICES
IBM 3084
● Batch Processing ● Public Network Access
● Timesharing ● Laser Printing
Route 202, Raritan, N.J. 08869
201-685-3400
Contact: Joyce Bogaenko

COMPUTER TIMESHARING

- We broker computer time.
- We find your lowest prices
- Nationwide service since 1968.
- All mainframes.
- NEVER a charge to the Buyer.
- Our fees paid by the Seller.

Call Don Selden at
Computer Reserves, Inc.
(201) 688-6100

Specialist in Conversion
Honeywell to IBM
Autocoder to Cobol
Assembler to Cobol
RPG to Cobol
Informix
Microsoft C
JMJ Technologies, Inc.
14 Elliott Avenue
Suite #6
Bryn Mawr, Penna 19010
(215) 527-0775

The Computerworld CLASSIFIED MARKETPLACE Reaches Over 612,000

Computer Professionals When They Reach For COMPUTERWORLD!

Call for more information
(800) 343-6474

COMPUTER SERVICES

MVS/XA VM/SP
ISPF/PDF CMS
IMS SAS
CICS FOCUS
DB2/QMF INQUIRE

TYMNET
LASER PRINTING
(415) 768-1390
Unisys 1100/92 Services Also Available

BECHTEL
INFORMATION SERVICES

NEW AND USED RAISED FLOORING
Immediate Delivery
Quality Installation
Raised Computer Floors
One Charles Street
Westwood, NJ 07675
(201) 666-8200
FAX (201) 666-3743

Educate your customers through Computerworld Classified Marketplace's *Training Section.*
For More Information Call (800) 343-6474

Yes, there still is
DEC-20 TIMESHARING
LANDART SYSTEMS INC
65 Broadway
New York, NY 10006
(212) 363-3170

CLASSIFIED

Software

FREE BUYER'S GUIDE

When you need programmer's development tools, Programmer's Connection is your best one-stop source. We are an independent dealer representing more than 300 manufacturers with over 800 software products for IBM personal computers and compatibles including: COBOL compilers and utilities, relational databases, and much more. Call today to receive a **FREE** comprehensive Buyer's Guide, and find out why Programmer's Connection is your best connection for software tools.

Programmer's Connection
7249 Whipple Ave NW
North Canton, Ohio 44720
US 800-336-1166

Canada	800-225-1166
OH & AK (Collect)	216-494-3781
FAX	216-494-5260
Telex	9102406879
International	216-494-3781

UNIX

- 200+ major UNIX exhibitors
- Intensive all-day tutorials
- Daily keynote addresses
- Marketing/technical briefings
- FREE basic UNIX workshops

REGISTER TODAY!
FREE SHOW PASSES!
Call: 800-323-5155
(312-299-3131 in Illinois & outside U.S.)

UniForum
The International Conference of UNIX Systems Users
February 28 – March 2, 1989
San Francisco, California
Moscone Center

MVS PRODUCTS/IDEAS

Major software developer/marketer is interested in acquiring or representing high quality MVS, MVS/XA, CICS, TSO, VSAM, DASD performance/productivity optimizing software utilities, products or new ideas. We invite responses in absolute confidence to Box 35570 Monte Sereno, CA 95030

CLASSIFIED MARKETPLACE Is Here!

Reach Over 612,000 Computer Professionals!
Call for all the details
(800) 343-6474
(508) 879-0700

Graphics/Desktop Publishing

COMPUTER DATA DISPLAYS

PC Screen to Large Screen
Look to BOXLIGHT—The LCD Specialist—For the Right System to Meet Your Needs:

KODAK DATASHOW

+Elki, Apollo, Chisholm and others
Prices start at
$599
Solutions for VGA, EGA, CGA, all MACs & more
M/C, VISA, AMEX & COD

BOXLIGHT CORPORATION
(415) 892-4744
Computer-Based Presentation Systems Since 1984

The Computerworld CLASSIFIED MARKETPLACE Reaches Over 612,000

Computer Professionals When They Reach For
COMPUTERWORLD!
Call for more information
(800) 343-6474

Hardware

386

The Fastest 286 & 386 Systems on Earth!
Only Limited Quantity Available

286/12 Mhz w/ 0K upgradable to 4MB	$220.00
286/16-20 Mhz w/ 0K	$450.00
386/16 Mhz w/ 0K	$980.00
386/20 Mhz w/ 0K	$1200.00
386/25 Mhz w/ 0K	Call

(805) 964-3535

HiTech Materials

FOR SALE!

12MHz AT Systems (starting at $1295.00)

20MHz 386 Systems (starting at $2495.00)

Call
NCC
(508) 820-0335

Business Opportunities

COMPUTER TAPE CERTIFICATION

LOCATION	PRICE PER TAPE
Western States	$3.50
All Other States	$4.00

We specialize in computer tape cleaning & certification. Our price includes all UPS freight charges, so we will reimburse you for shipping costs incurred in sending us the tapes & return them to you within one day at our expense. Terms are net 30.

PHOENIX COMPUTER SERVICE
8949 Reseda Blvd., Unit 107
Northridge, CA 91324
(800) 727-TAPE

Your Advertisement For:

- ☐ *Used/Lease/Rent*
- ☐ *Hardware*
- ☐ *Software*
- ☐ *Peripherals/Supplies*
- ☐ *Communications*
- ☐ *Graphics/Desktop Publishing*
- ☐ *Time/Services*
- ☐ *Bids/Proposals/Real Estate*
- ☐ *Business Opportunities*

Can appear here in
Computerworld
CLASSIFIED MARKETPLACE
(800) 343-6474
(In MA., (508) 879-0700)

Peripherals/Supplies

GENUINE HEWLETT PACKARD TONERS $79.50

Series II 92295A/92291A
Or
Original 92295A/92291A

Huge Inventory In Stock
For Same Day Shipment Call
+1-800-22-TONER
+1-800-228-6637
Plotter Supplies At Similar Savings
TONERS PLUS...

The Classified MARKETPLACE

Reach Over 612,000 Computer Professionals When They Reach For
COMPUTERWORLD!
(800) 343-6474
(In MA. (508) 879-0700)

Bids/Proposals/Real Estate

MISSISSIPPI CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 301 N. Lamar St., 301 Building, Suite 508, Jackson, MS 39201 for the following eq.'pment and services:

Request for Proposal No. 1481, due Thursday, February 23, 1989 at 3:30 p.m. for the acquisition of an SNA/SAA compatible distributed processor to address the data processing needs of several divisions of the MISSISSIPPI STATE HIGHWAY DEPARTMENT.

Request for Proposal No. 1482, due Tuesday, February 7, 1989 at 3:30 p.m. for the acquisition of one microcomputer-based CADD system with three workstations and related peripherals to network with existing PSI equipment and software for MISSISSIPPI DELTA COMMUNITY COLLEGE.

Request for Proposal No. 1485, due Wednesday, February 15, 1989 at 3:30 p.m. for the acquisition of a 35mm Film Recorder System and Business Graphics Subsystem which is compatible with an existing Cubcomp PictureMaker/30 System for the Media Center at HINDS COMMUNITY COLLEGE.

Request for Proposal No. 1486, due Wednesday, February 22, 1989 at 3:30 p.m. for the acquisition of two turnkey distributed processing systems, peripherals, and software support to upgrade the existing Unisys 5000/90 minicomputer network for the MISSISSIPPI DEPARTMENT OF CORRECTIONS at Jackson and Parchman, Mississippi.

Request for Proposal No. 1487, due Tuesday, February 14, 1989 at 3:30 p.m. for the acquisition of a 1600 bpi tape subsystem to connect to an existing IBM System/38 minicomputer for ITAWAMBA JUNIOR COLLEGE.

Request for Proposal No. 1488, due Thursday, February 16, 1989 at 3:30 p.m. for the acquisition of a intelligent, high resolution, color-graphics workstation totally compatible with an existing CDC CYBER 205 supercomputer system for the Department of Mechanical Engineering of the UNIVERSITY OF MISSISSIPPI.

Request for Proposal No. 1489, due Thursday, February 23, 1989 at 3:30 p.m. for the acquisition of an Ink-Jet printer to connect to an IBM 5520 Administrative computer system for MISSISSIPPI STATE UNIVERSITY, Mississippi Cooperative Extension Service.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Patsy Stanley @ (601) 359-2604

The City of Los Angeles' Office of the City Clerk will be seeking proposals for the development and implementation of a new accounting, tax collection and management information system for the City Clerk's Tax and Permit Division. This Division collects and must account for some $1.1 billion in various city taxes and permits. Proposers are required to have experience with accounting, expert and relational database systems. The current database contains 270,000 records. Interested parties should request a copy of the RFP (Request for Proposal) by contacting:

Alisa Kramer
Systems Division
Office of the City Clerk
Room 395, City Hall
200 N. Spring Street
Los Angeles, CA. 90012

or call (213) 485-4797. The initial mailing will go out on February 14, 1989.

NOTICE OF INVITATION FOR PROPOSALS

The City of Eau Claire, Wisconsin, will receive step one proposals in the office of the City Purchasing Agent at 203 South Farwell Street until 4:00 p.m. Central Time on March 15, 1989 for Procurement No. 8836, Financial Accounting, Payroll, and Purchasing Software. HP 3000 Environment.

All forms and documents related to this notice and the procurement it describes are on file and available from the office of the Purchasing Agent, 203 South Farwell Street, Eau Claire, WI 54702-5148. Telephone 715/839-4916.

James W. Fering
Purchasing Agent

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for a DSAD Allocation Control Package.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 3:00 P.M. on February 6, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for Portable Terminals.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 2:00 P.M. on February 6, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for a Test System Real Storage Upgrade.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 10:00 A.M. on February 7, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for Tape Cartridge Conversion Kits and Accessories.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 10:00 A.M. on February 3, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for Database Utility Products.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 1:00 P.M. on February 3, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for a Roll System.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 10:00 A.M. on February 6, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for Technical Consultant Services.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 12:00 P.M. on February 7, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

REQUEST FOR PROPOSALS
FINANCIAL INFORMATION SERVICES AGENCY (FISA)
CITY OF NEW YORK

The Financial Information Services Agency of the City of New York is seeking proposals for Automated MTO Software.

Copies of the Request for Proposals may be obtained from Ms. Marlene Duran at the Financial Information Services Agency at 111 Eighth Avenue, 13th Floor, New York, NY 10011 or by phoning Ms. Duran at 212-206-3311.

A Proposers' Conference will be held at 2:00 P.M. on February 3, 1989; the deadline for receipt of proposals is 5:00 P.M. on February 14, 1989.

Further details re the conference, specifications and proposal submission may be found within the Request for Proposals.

COMPUTERWORLD's Classified MARKETPLACE

Examines the issues while Computer Professionals examine your message.
Call for all the details.
(800) 343-6474
In MA., (508) 620-7758

Training is CASE leading edge

Get management's sanction, nurture resources and proceed cautiously

BY MARK DUNCAN
SPECIAL TO CW

Computer-aided software engineering (CASE) calls for significant changes in MIS departments at both the managerial and staff levels. Training is therefore an essential accompaniment to the introduction of CASE. The astute MIS manager should consider the following training aspects, which will contribute to successful CASE implementation.

• **Train in CASE concepts as well as specific products.** CASE is more than a software tool and a type of environment. It is a philosophy that imposes an engineering discipline on the development of applications software. Therefore, training is required on two levels: concepts and tools.

At the conceptual level, CASE must be shown to embrace the entire range of development and maintenance. Conventional wisdom has popularized design tools and code generators as the circumference of CASE. But project management techniques, development methodologies, documentation generators, interactive testing tools and code restructurers all fall within the gamut of CASE. Indeed, strategic planning tools that spawn business models and information repositories are the true front end of CASE.

• **Develop internal specialists.** While it is certainly possible to purchase training from software and training vendors, greater flexibility may flow from development of internal specialists. Likely sources of these specialists are development center personnel and senior applications programmers and analysts. These individuals must be given time off from normal assignments to acquire knowledge, experience and fluency in CASE concepts and tools.

• **Plan training before heavy investment in CASE software.** Timely training is an essential accompaniment to any new CASE tool or technique. The curriculum planning for CASE training must reflect that it is a new and expanding field of system development. While it must address existing tools and techniques, it must also leave room for growth as CASE technology advances.

• **Make training consistent.** An MIS department embarking on CASE implementation must keep its training characteristics consistent as far as possible. Use the same vendor — preferably the same instructor — and the same training format and topics. This precaution will minimize disagreement and disparate styles among team members when applying CASE tools and techniques.

• **Consider the first one or two projects as an extension of training.** It is unreasonable to expect productivity improvements on the day CASE training ends and its application begins. On the contrary, because of learning curves and refinement of tool or methodology use, productivity may actually go down. Therefore, the first one or two projects that use CASE tools and techniques must be regarded as experimental and educational, an extension of the formal training. Nothing will damage the credibility of CASE as much as early failure.

• **Do not forget management.** It is management that sanctions change, secures budgets for hardware and software and answers to the client or user. Therefore, management must be a target of CASE training. Dollars saved, speedier development, error-free software, improved productivity and diminishing applications backlogs are topics guaranteed to grab management's attention. Management training should precede staff training to foster clear-cut commitment to CASE.

• **Do not forget the user.** An essential player throughout the application development cycle, the user will also feel the effects of CASE. Hitherto only of a segmented nature, user involvement under a CASE scenario will increase throughout the life cycle. Activities such as joint application design, prototyping deliverables and design walkthroughs will require the user to become more savvy. Familiarity with data flow diagrams, some screen design skills and frequent verification of prototyped deliverables will be expectations of future users.

• **Marry the CASE tools to a methodology.** CASE is as much about methodology as it is about software tools. Productivity improvement in system development can only be expected when appropriate automation is married to a methodology in a compatible environment. So training must address both areas to be effective. Teaching a methodology will lead only to disused CASE tools; teaching the use of software tools outside the framework of a methodology may simply result in the automation of weak and ineffective development practices.

• **Expect resistance from diehards.** Pockets of resistance among applications developers will inevitably exist. The trainer must use whatever means he can to sell CASE technology to these people. Gaining their compliance purely on the benefits of CASE is the best one could hope for, but trainers may also have to bring to bear the influence of peer pressure and written policy on CASE commitment.

• **Do not upgrade or change CASE tools too soon.** No sooner do managers acquire one tool than they hear of another, which naturally has a few more bells and whistles than the one they already possess. Rapid change in an emerging technological field is normal, but it is often followed by a shakeout in the industry which, after dropouts and new alliances, will only leave a handful of survivors.

MIS therefore should be wary of changing horses in mid-race. It is better to make a moderately strong commitment to one vendor or to one family of CASE tools and to stick with it until the product has truly outlived its useful life, the staff has outgrown the product or the product no longer fits the need.

TEACHING THE use of software tools outside the framework of a methodology may simply result in the automation of weak and ineffective development practices.

Duncan is a quality assurance consultant at a large Dallas bank.

Educate your customers through Computerworld Classified Marketplace's

Training Section.

For More Information Call

(800) 343-6474

COMPUTERWORLD
CLASSIFIED MARKETPLACE
Where all computer buyers and sellers can go to market.

The best workbooks are also the most cost-effective:

FastDoc™
for PCs and MACs

▲ Customize workbooks for Lotus 1-2-3, Excel, WordPerfect & 16 other leading programs
▲ Produce as many workbooks as you need at no extra cost
▲ Stored as Pagemaker templates—easy to use
▲ Favorably reviewed as "simple but shrewd" and "most promising"

Phone today for your free DemoDoc
1-800-441-5441

KDA Software, Inc.
315 E. Third Street, P.O. Box 1163, Centralia, IL 62801

The Classified MARKETPLACE

Reach Over 612,000 Computer Professionals When They Reach For

COMPUTERWORLD!
(800) 343-6474
(In MA. (508) 879-0700)

FREE

Computer Training

Today's best software programs are worthless until you know how to use them. With ATI's computer-based training, you can learn a new software program right on your computer. In *half the time* it used to take.

Call or write today to get a FREE 5¼" diskette with 15-20 minutes of computer-based training on: (choose only one)

☐ dBASE IV ☐ Lotus 1-2-3 ☐ Word Perfect 5.0

Call: **1-800-421-4827** (Dept. 100)
or 1-213-823-1129 (in CA)
Or mail your request to:

ATI American Training International
12638 Beatrice St., Dept. 100 Los Angeles, CA 90066

Go Shopping in...
Computerworld's Classified
MARKETPLACE
Call for all the details
(800) 343-6474
Or Fax your ad to:
(508) 820-7738

COMPUTERWORLD

SALES OFFICES

Publisher/Fritz Landmann

Vice President/Associate Publisher/Val Landi, **COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, (508) 879-0700

BOSTON: Northern Regional Director/David Peterson, Sr. **District Managers**/Bill Cadigan, Sherry Driscoll, **District Manager**/John Watts, **Sales Assistants**/Alice Longley, Lisa Bonaccorso, Paula Wright, **COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

CHICAGO: Eastern Regional Director/Bernie Hockswender, **Midwest Regional Manager**/Kevin McPherson, **District Manager**/Larry Craven, **Sales Assistants**/Kathy Sullivant, Karol Lange, **COMPUTERWORLD**, 10400 West Higgins Road, Suite 300, Rosemont, IL 60018, (312) 827-4433

NEW YORK: Eastern Regional Director/Bernie Hockswender, **District Managers**/Fred Lo Sapio, Frank Genovese, **Sales Assistant**/Linda Pipines, **COMPUTERWORLD**, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

LOS ANGELES: Western U.S Director/Jan Harper, **Southwestern Regional Manager**/Carolyn Knox, **District Manager**/Darren K. Ford, **Sales Assistant**/Bev Raus, **COMPUTERWORLD**, 18004 Sky Park Circle, Suite 255, Irvine, CA 92714 (714) 261-1230

SAN FRANCISCO: Western U.S Director/Jan Harper, **Senior District Manager**/Ernie Chamberlain, **District Managers**/Michela O'Connor, Alicia Saribalis, **Sales Assistants**/Chris Kobayashi, Nurit Zekman, **COMPUTERWORLD**, 500 Airport Boulevard, Suite 400, Burlingame, CA 94010 (415) 347-0555

ATLANTA: Eastern Regional Director/Bernie Hockswender, **Southeastern Regional Manager**/Kevin C. Harold, **Account Manager**/Melissa Christie Neighbors, **Sales Assistant**/Debra Brown, **COMPUTERWORLD**, 1400 Lake Hearn Drive, Suite 330, Atlanta, GA 30319 (404) 394-0758

DALLAS: Eastern Regional Director/Bernie Hockswender, **Southeastern Regional Manager**/Kevin C. Harold, **Sales Assistant**/Brenda Shipman, **COMPUTERWORLD**, 14651 Dallas Parkway, Suite 304, Dallas, TX 75240 (214) 233-0682

WASHINGTON, D.C.: Eastern Regional Director/Bernie Hockswender, **District Manager**/Paula Smith, **COMPUTERWORLD**, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

Classified Advertising Director/John Corrigan, 375 Cochituate Rd., Framingham, MA (508) 879-0700

Midwest Account Manager/Marie Keyes, 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171, (508) 879-0700

New England Account Manager/Paul Bonarrigo, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

Western Account Manager/Karen Massimino, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

RECRUITMENT ADVERTISING SALES OFFICES:

New England/375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

Mid-Atlantic Recruitment Manager/Warren Kolber, Paramus Plaza 1, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

Midwest Recruitment Manager/Patricia Powers, O'Hare Corporate Tower One, 10400 West Higgins Road, Suite 300, Rosemont, IL 60018 (312) 827-4433

Western Recruitment Manager/Barbara Murphy, 18004 Skypark Circle, Suite 100, Irvine, CA 92714 (714) 250-0164

South-Atlantic Recruitment Manager/Kathryn Kress, 8304 Professional Hill Dr., Fairfax, VA 22031 (703) 573-4115

Recruitment Account Executives: New England/Nancy Percival, **Mid-Atlantic**/Jay Novack, **South-Atlantic**/Pauline Smith, **Midwest/Ellen Casey, Western**/Chris Glenn, 1-800-343-6474 or (508) 879-0700

IDG INTERNATIONAL MARKETING SERVICES: Managing Director/Frank Cutitta, **COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

West Coast Marketing Manager/Leslie Barner, 3350 West Bayshore Road, Suite 201, Palo Alto, CA 94303 (415) 424-1001

CW PUBLISHING/INC.

An IDG Communications Company

Fritz Landmann/President

Computerworld Headquarters: 375 Cochituate Road, P.O. Box 9171, Framingham, MA 01701-9171
Phone: 508-879-0700, Telex: 95-1153, FAX: 508-872-8564

Vice President/Associate Publisher, Val Landi

OPERATIONS Vice President/Operations, Matthew Smith. **Business Manager**, Mark Sullivan.
SALES Advertising Director, Carolyn Novack. **National Recruitment Sales Director**, John Corrigan.
Display Advertising Production Manager, Maureen Carter. **Classified Operations Manager**, Cynthia Delany.

MARKETING Vice President Marketing & Circulation, Jack Edmonston. **Marketing Communications Director**, Jan Bell.
Marketing Services Director, Audrey Shohan. **Manager/Marketing Communications**, Mary Doyle.

CIRCULATION Vice President Marketing & Circulation, Jack Edmonston.
Director of Circulation Management, Maureen Burke. **Director of Circulation Promotion**, Carol Spach.

PRODUCTION Production Director, Leigh Horneth. **Assistant Production Director**, Carol Polack.
Production Manager, Beverly Wolff. **Art Director**, Tom Monahan.

FOREIGN EDITORIAL/SALES OFFICES

Argentina: Ruben Argento, CW Communiaciones S/A, Av. Belgrano 406-Piso 9, CP 1092 Buenos Aires. Phone: (011) 54 134-5583. Telex: (390) 22644 (BAZAN AR).

Asia: S.W. Chan, Asian Computerworld Communications Ltd., 701-4 Kam Chung Bldg., 54 Jaffe Road, Wanchai, Hong Kong. Phone: (011) 852 5 861 3238. Telex: (780) 72827 (COMWOR HX). FAX: (011) 852 5 86 10953.

Australia: Alan Rower, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (011) 61 2 4386133. Telex: (790) AA74752 (COMWOR). FAX: (011) 61 2 439 5512.

Austria: Manfred Weiss, CW Publikationen Verlags Ges.m.b.H., Ziegelgasse 6, A-1070 Wien, Austria. Phone: (011) 43-93-16-31-0 or (011) 43-93-05-08-0. Telex: 115542 SCH/A. FAX: (011) 43-93-05-08-33.

Brazil: Ney Krusl, Computerworld do Brazil Ltda, Praca Floriano, 19/26 Ander, CEP:20031 Rio de Janiero. Phone: (011) 55 21 240 8225. Telex: (391) 21 30830 BR.

Denmark: Preben Engell, Computerworld Danmark A/S, Torvegade 52, 1400 Copenhagen K, Danmark. Phone: (011) 45 1955 695. Telex: (855) 31566. FAX: (011) 45 154 56 14.

France: Francois Cheusonniere, Computerworld Communications S.A., 185 Avenue Charles De Gaulle, 92200 Neuilly Sur Seine, France. Phone: (011) 33 14 747 1272. Telex: (842) 613234 F. FAX: (011) 33 14 241552.

Hungary: Dezso Futasz, Computerworld Informatika Co., Kft. Pf. 386, 1536 Budapest, Hungary. Phone: (011) 36 1 228 458. Telex: (861) 22 6307 (KSH H).

Italy: Umberto Costamagna, Computer Publishing Group S.R.L. Via Vida 7, 20127 Milano, Italy. Phone: (011) 39-2-2613432. Telex: (843) 335318. FAX: (011) 39 2 282 0886.

Japan: Dick Yamashita, Computerworld Japan, Akasaka Omotemachi Bldg., Minato-Ku, Tokyo 107. Phone: (011) 81 3 551 3882. Telex: (781) 252-4217. FAX: (011) 81 3 582 7239.

M. Nakamura, IDG Communications, Japan, c/o Mercom International, Inc., Akasaka Center Building, 1-3-12 Motoakasaka, Minato-ku, Tokyo 107, Japan. Phone: (011) 81 3 403-8515. Telex: (781) J27941 (reps for all CW Publishing publications except Computerworld Japan).

Mexico: Henry Morales, Computerworld Mexico S.A. de C.V., Oaxaca 21-2, Mexico City 7 D.F. Colonia Roma. 06700 Mexico. Phone: (905) 514 4218 or 6309. Telex: (383) 177 1300 (ACHAME).

The Netherlands: Wout Berends, CW Communications B.V., van Eeghenstraat 84, 1071 GK Amsterdam, The Netherlands. Phone: (011) 31 20 646426. Telex: (844) 18242 (CWCOM NL).

New Zealand: Martin Taylor, Computerworld Communications Ltd., 2nd Floor, 15 Augustus Terrace, Parnell, Auckland, New Zealand. Phone: (011) 64-9-779-902. Fax: (011) 64 9 774 804.

Norway: Morten Hansen, CW Norge A/S, Hovinveien 43, 0576, Oslo 5, Norway. Phone: (011) 472 647725. Telex: (856) 76476 (CW NOR N). FAX: (011) 47 268 0152.

People's Republic of China: Chen Mingkun, China Computerworld, 74 Lu Gu Road, Box 750, Beijing 100039, People's Republic of China. Phone: (011) 47 814 0044. Telex: (716) 222214 (CCW CN).

Spain: Paco Zabala, CW Communications, S.A., Rafael Calvo, 18, 4B, 28010 Madrid, Spain. Phone: (011) 34 1 419 4014. Telex: (831) 45522 (CW E). FAX: (011) 341 419 61 04.

Sweden: Bengt Mamfeldt, CW Communications AB, Sodra Hemmagen 22, S-115 41 Stockholm, Sweden. Phone: (011) 46 8 67 91 80. Telex: (854) 14904 9 (NOVACW). FAX: (011) 46 8 65 3132.

Switzerland: Gebhard Osterwalder, CW Publikationen AG, Witikonerstrasse no. 15, Postfach 253, CH - 8030 Zurich, Switzerland. Phone: (011) 41 1 55 10 77. Telex: (845) 816 710 (CWC) CH). FAX: (011) 41 1 55 1135.

Taiwan: Leone Wang, ACE Media Agency Co. Ltd., P.O. Box 26-57B, Room 503#1, Fu Hsin, S. Road Sec 1, Taipei, Taiwan, R.O.C. Phone: (011) 886 2 721 4302. Telex: (785) 14142 (ACE GROUP). (Representative for all CWCI publications). FAX: (011) 886 2 731 0420.

London: Martin Durham, CW Communications Ltd., 99 Grays Inn Rd., London, WCI 8UT, United Kingdom. Phone: (011) 44 1 831 9252. Telex: (851) 262346 (THEPUB G). FAX: (011) 44 1 405 2347.

United Kingdom: Euan Rose, Beere Hobson & Associates, 34 Warwick Road, Kenilworth, Warwickshire, CV8 1HE, United Kingdom. Phone: (011) 44 926 512424. Telex: (851) 311951 (BEEHOB). (Representative for all CWCI publications). FAX: (011) 44 926 512948.

Venezuela: Kalman von Vajna Nagy, CW Comunicaciones, C.R.L. Tore Maracaibo, Piso 13, Oficina H, Av. Libertador, Caracas, Venezuela. Phone: (011) 58 2 72 76 30. FAX: (011) 58 2 724970.

West Germany: Eckhard Utpadel, CW Publikationen Verlagsgesellschaft mbH, Rheinstrasse 26/28, Postfach 40 0428, 8000 Munich 40, West Germany. Phone: (011) 49 89 360860. Telex: (841) 5215350. (COMW D). FAX: (011) 49 89 3 60 86100.

IDG COMMUNICATIONS/INC.

Patrick J. McGovern	Axel Leblois	William P. Murphy
Board Chairman	Chief Executive Officer	Vice President/Finance

Computerworld is a publication of IDG Communications, the world's largest publisher of computer-related information. IDG Communications publishes over 90 computer publications in 33 countries. Fourteen million people read one or more IDG Communications publications each month. IDG Communications publications contribute to the IDG News Service offering the latest on domestic and international computer news. IDG Communications publications include: ARGENTINA'S Computerworld Argentina; ASIA'S Communications World, Computerworld Hong Kong, Computerworld Southeast Asia, PC Review; AUSTRALIA'S Computerworld Australia, Communications World, Australian PC World, Australian Macworld; AUSTRIA'S Computerwelt Oesterreich; BRAZIL'S Dataforum, PC Mundo, Micro Mundo; CANADA'S Computer Data; CHILE'S Informatica, Computacion Personal; DENMARK'S Computerworld Danmark, PC World Danmark, CAD/CAM World; FINLAND'S Mikro, Tietoviikko; FRANCE'S Le Monde Informatique, Distributique, InfoPC, Telecoms International; GREECE'S Computer Age; HUNGARY'S Computerworld SZT, PC Mikrovilag; INDIA'S Dataquest, PC World India; ISRAEL'S People & Computers Monthly, Personal & Computerworld Weekly, SIBN Monthly; ITALY'S Computerworld Italia; JAPAN'S Computerworld Japan, Semicon News; MEXICO'S Computerworld Mexico, PC Journal; THE NETHERLANDS' Computerworld Netherlands, PC World Benelux; NEW ZEALAND'S Computerworld New Zealand, Computerworld Norge, PC World Norge; PEOPLE'S REPUBLIC OF CHINA'S China Computerworld, China Computerworld Monthly; SAUDI ARABIA'S Arabian Computer News; SOUTH KOREA'S Computerworld Korea, PC World Korea; SPAIN'S Dimension, Computerworld Espana, Commodore World, PC World Espana, Comunicaciones World; SWEDEN'S Computer Sweden, MikroDatorn, Svenska PC World; SWITZERLAND'S Computerwelt Schweiz; UNITED KINGDOM'S Computer News, ICL Today, Lotus, PC Business World; UNITED STATES' Amiga World, CD-ROM Review, CIO, Computer Currents, Computerworld, Digital News, Federal Computer Week, GO Mikro, Focus Publications, InCider, Infoworld, Macintosh Today, Macworld, Computer + Software News (Micro Marketworld/Lotus-Friedman), Network World, PC Letter, PC World, Portable Computer Review, Publish!, PC Resource, Run; VENEZUELA'S Computerworld Venezuela; WEST GERMANY'S Computerwoche, Information Management, PC Welt, PCWoche, Run/Run Specials.

ADVERTISERS INDEX

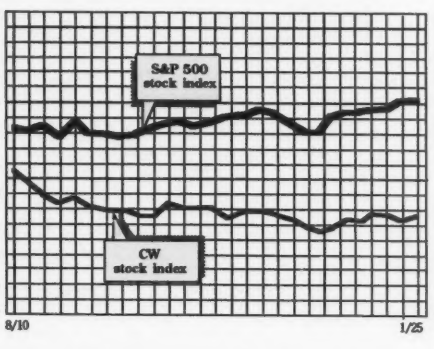
Amdahl DASD	48-49
Attachmate Corporation	54
Avatar Corp.	32
B.I. Moyle & Associates	23
BMC Software	29
Boole & Babbage	18
Chicago Soft	43
Cincom Systems	24
Communication Networks '89	17
Compuware	10
CRS Industries	34
CW Circulation	82
CW Conference	SR9
CW Testimonial	SR25
Data General Corp.	22
Data Group	47
Duquesne Systems	52-53
Electrohome	50
EMC Corp.	12
Epson America	56-57
Hewlett Packard	41
Informix Software Inc.	64-65
Integral Systems	58
Interface Group	37
Interface Systems	25
KMW Systems	44
Leasametric	60
Levi,Ray & Shoup	28
Micro Focus	33
Microsoft Systems	46-47
Mitek Systems	16
MSA	C4
Multi-Tech Systems	51
NEC	C3
Novell	42-43
Oracle Corporation	5,11,13
Progress Software	59
Qualstar	51
Radio Shack	36
Realia	19
Relational Technology Inc.	30-31
SAS Institute	14-15
Software Engineering of America	9
Sonetics	40
Symantec	35
Syncsort	3
3 Com	SR1-SR3,SR7,SR11,SR13, SR16-SR17,SR21,SR23,SR24/25, SR26-SR27,SR29,SR31,SRC3,SRC4
Travtech	30
Unisys	62-63
Universal Data Systems	38
VM Software	7
Wang	26-27

This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.

Look for These Upcoming Special Editorial Features in Computerworld

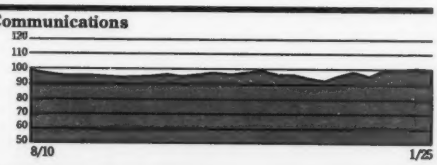
Issue Date	Executive Reports	Product Spotlights
Feb. 6		Micro-to-Host Links
Feb. 13	Special Feature: Recruitment	Performance Management Tools
Feb. 20	Strategic Planning	
Mar. 6	Special Feature: Systems Integration Executive Report: MIS in the Federal Government	
Mar. 13		Disaster Prevention & Recovery
Mar. 20	Human Resource Development	
Mar. 27		CASE Products

STOCK TRADING INDEX

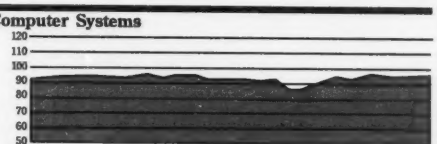


Indexes	*Last Week*	*This Week*
Communications	100.6	99.4
Computer Systems	94.1	95.9
Software & DP Services	105.8	108.5
Semiconductors	55.0	55.7
Peripherals & Subsystems	79.0	80.2
Leasing Companies	89.9	95.0
Composite Index	81.6	83.2
S&P 500 Index	120.8	121.6

Communications



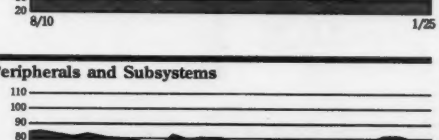
Computer Systems



Software and DP Services

Semiconductors

Peripherals and Subsystems



Leasing Companies

CW CHARTS

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JAN. 25, 1989

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JAN. 25 1989	WEEK NET CHNGE	WEEK PCT CHNGE
Communications and Network Services						
Q	ANDREW CORP	20	13	19.5	0.5	2.6
Q	ARTEL COMM CORP	3	1	1.563	0.0	0.0
N	AT&T	31	24	30.875	1.1	3.8
Q	AVANT GARDE COMP INC	3	0	0.407	-0.2	-27.7
Q	AVANTEK INC	8	4	5.75	0.3	4.5
N	AYDIN CORP	17	13	15	-0.5	-3.2
N	BELL ATLANTIC CORP	75	64	73.125	1.1	1.6
N	BELLSOUTH CORP	44	37	41.625	1.4	3.4
Q	COMPRESSION LABS INC	5	3	3.25	-0.1	-3.7
Q	COMPUTER NETWORK TECH	2	1	1.86	0.0	-2.5
O	CONTEL CORP	45	31	44.25	2.0	4.7
Q	DATA SWITCH CORP	10	5	5.625	-0.3	-4.3
Q	DIGITAL COMM ASSOC	28	17	24.5	1.6	7.1
Q	DYNATECH CORP	24	17	18.25	-0.8	-3.9
Q	FIBRONICS INTERNATIONAL INC	5	2	3.75	-0.3	-8.3
Q	GANDALF TECHNOLOGIES	8	5	5.375	-0.1	-2.3
Q	GENERAL DATACOMM INDS	5	3	4.625	-0.1	-2.6
N	GTE CORP	40	34	45.625	0.4	0.8
Q	INFOTRON SYS CORP	14	7	10.25	-0.3	-2.4
N	ITT CORP	55	44	54.25	1.6	3.1
N	M A COM INC	11	8	8.875	0.3	2.9
Q	MCI COMMUNICATIONS CORP	25	10	22.875	-0.3	-1.1
Q	NETWORK EQUIPMENT TECH INC	23	14	19.5	1.5	8.3
Q	NETWORK SYS CORP	12	7	9.5	0.0	0.0
N	NORTHERN TELECOM LTD	20	16	15.75	-0.8	-4.5
Q	NOVELL INC	33	18	29.875	0.0	0.0
N	NYNEX CORP	71	61	68.125	0.6	0.9
N	PACIFIC TELESIS GROUP	33	27	32.625	1.4	4.4
N	PARADYNE CORP	10	4	10.125	0.0	0.0
N	PENRIL CORP	5	3	4.5	0.1	2.9
N	PLESSEY PLC	44	25	41.938	2.1	5.2
N	SCIENTIFIC ATLANTA INC	16	10	14.125	0.4	2.7
N	SOUTHWESTERN BELL CORP	43	34	42.875	1.9	4.6
Q	3 COM CORP	25	16	23.375	0.8	3.3
N	U S WEST INC	60	50	59.875	1.9	3.2
Computer Systems						
Q	ALLIANT COMPUTER SYS	9	3	3.625	0.0	0.0
Q	ALPHA MICROSYSTEMS	8	4	7	0.8	12.0
Q	ALTOS COMPUTER SYS	13	7	7.25	-0.5	-6.5
A	AMDAHL CORP	28	15	20.75	0.3	1.2
Q	APOLLO COMPUTER INC	17	7	7.875	-0.5	-6.0
Q	APPLE COMPUTER INC	48	36	41.5	1.8	4.4
N	BOLT BERANEK & NEWMAN	19	10	10.25	-0.5	-4.7
Q	BRITTON LEE INC	3	1	3.063	-0.2	-5.8
N	COMPAQ COMPUTER CORP	68	42	67.625	6.9	11.3
Q	COMPUTER AUTOMATION INC	14	3	4.875	0.4	8.3
A	COMPUTER CONSOLES INC	13	5	12.5	0.0	0.0
Q	CONCURRENT COMP CORP	7	4	4.875	0.1	2.6
N	CONTROL DATA CORP	31	16	20.5	-0.4	-1.8
Q	CONVERGENT TECH	7	3	6.875	0.0	0.0
Q	CONVEX COMPUTER CORP	11	6	10.875	1.1	11.5
N	DAY RESH INC	89	53	80.25	-2.9	-4.6
Q	DAISY SYS CORP	12	6	6.625	0.4	6.0
N	DATA GEN CORP	28	17	17.375	-0.9	-4.8
N	DATAPOINT CORP	6	4	4.375	-0.3	-5.4
Q	DELL COMPUTER CORP	13	8	8.75	-0.5	-5.4
N	DIGITAL EQUIP CORP	127	86	111.625	12.0	12.0
N	FLOATING POINT SYS INC	5	2	3.125	0.0	0.0
N	HARRIS CORP	33	25	28	-0.3	-0.9
N	HEWLETT PACKARD CO	66	44	55.75	2.6	4.9
N	HONEYWELL INC	77	57	50.75	-1.5	-2.4
N	IBM	130	104	123.25	-1.8	-1.4
Q	INFORMATION INTL INC	16	11	14.5	0.0	0.0
Q	IPL SYS INC	6	1	5.5	0.6	12.8
N	MAI BASIC FOUR INC	21	8	8	-0.1	-8.0
Q	MASSACHUSETTES COMPUTER CO	7	4	NA	0.0	0.0
N	MATSUSHITA ELEC INDL LTD	230	169	195.25	-7.8	-3.8
Q	MEGADATA CORP	4	1	1.625	-0.1	-7.1
Q	MENTOR GRAPHICS CORP	37	20	28	-0.8	-2.6
N	NBI INC	7	1	1.875	0.3	15.4
N	NCR CORP	70	51	56.75	1.9	3.4
N	PRIME COMPUTER INC	20	12	19.375	0.6	3.3
Q	PYRAMID TECHNOLOGY	17	8	16	0.0	0.0
Q	SILICON GRAPHICS CORP	25	14	18.75	1.0	5.6
Q	STRATUS COMPUTER	32	21	30	2.0	7.1
Q	SUN MICROSYSTEM INC	20	13	18.625	1.0	5.7
Q	SYMBOLICS INC	2	1	1.125	0.2	19.9
Q	SEQUENT COMPUTER SYS INC	22	14	22	3.1	16.6
N	TANDEM COMPUTERS INC	22	12	18.625	0.4	2.1
N	TANDY CORP	49	33	39.75	1.4	3.6
N	ULTIMATE CORP	17	8	8.875	-0.1	-1.4
N	UNISYS CORP	39	25	29	-0.5	-1.7
A	WANG LABS INC	17	8	8	-0.5	-5.9
Software & DP Services						
Q	ADVANCED COMP TECH	3	1	1.751	-0.1	-3.4
Q	AMERICAN MGMT SYS INC	19	12	17.625	1.1	6.8
Q	AMERICAN SOFTWARE INC	18	9	17.75	0.6	3.6
Q	ANACOMP INC	12	6	6.875	-0.3	-3.5
Q	ANALYSTS INTL CORP	15	7	14.375	0.6	4.5
Q	ASHTON TATE	31	20	20.875	-0.9	-4.0
Q	ASK COMPUTER SYS INC	17	9	16.75	1.0	6.3
Q	AUTODESK INC	31	17	30.75	2.0	7.0
N	AUTO DATA PROCESSING	47	35	38.5	-0.5	-1.3
Q	BMS SOFTWARE INC	15	8	14.025	-1.0	-6.5
Q	BOOLE & BABBAGE INC	12	7	11.75	0.8	6.8
N	BUSINESSLAND INC	15	8	13.625	0.4	2.8
N	COMPUTER ASSOC INTL INC	36	24	35.375	2.6	8.0
Q	COMPUTER HORIZONS CORP	12	7	9.875	0.0	0.0
N	COMPUTER SCIENCES CORP	53	38	49.125	-0.9	-1.8
Q	CORPORATE SOFTWARE	15	8	10.5	0.8	7.7
N	COMPUTER TASK GROUP INC	17	10	13.25	0.0	0.0
Q	COGNOS INC	9	5	9	-0.1	-1.4
Q	COMSHARE INC	25	13	24	2.5	11.6
N	CULLINET SOFTWARE INC	9	4	8.125	-0.3	-3.9
Q	DUQUESNE SYS INC	24	16	22.125	0.9	4.1
N	GENERAL MTRS (CLS E)	46	36	45.75	-0.4	-0.8
Q	HOGAN SYS INC	6	3	5	0.1	2.6
Q	INFORMIX CORP	25	7	9.25	1.4	17.5
Q	INTELLICORP INC	4	2	3.125	-0.3	-7.4
Q	KEANE INC	18	7	18.25	4.3	30.4
Q	LOTUS DEV CORP	34	15	19.75	0.3	1.3
Q	MANAGEMENT SCI AMER	14	6	8.75	-0.1	-1.4
Q	MICRO PRO INTL CORP	4	2	2.188	0.1	3.0
Q	MICROSOFT CORP	71	45	53	1.5	2.9
Q	MORINO ASSOCIATES INC	20	12	18.5	0.3	1.4
Q	NATIONAL DATA CORP	32	19	24.25	-0.3	-1.0
Q	ON LINE SOFTWARE INTL INC	14	4	4.625	-0.1	-2.6
Q	ORACLE SYS CORP	24	12	23.25	2.5	12.0
N	PANSOPHIC SYS INC	19	12	13.875	-0.4	-2.6
Q	PHOENIX TECHNOLOGIES INC	18	12	15.375	0.4	2.5
Q	POLICY MGMT SYS CORP	26	19	24	-0.3	-1.0
Q	PROGRAMMING & SYS INC	18	10	16.375	-0.6	-3.7
Q	RABBIT SOFTWARE INC	3	2	3	0.0	0.0
Q	RELATIONAL TECHNOLOGY INC	21	12	14	-1.0	-6.7
Q	REYNOLDS & REYNOLDS CO	28	17	27.25	1.8	6.9
Q	SEI CORP	22	14	16.75	0.3	1.5
Q	SHARED MED SYS CORP	27	14	17	0.6	3.8
Q	SAGE SOFTWARE INC	8	5	7.75	0.5	6.9
Q	SOFTWARE PUBG CORP	27	9	18.375	1.3	7.3
A	STERLING SOFTWARE INC	9	5	6	0.1	2.1
Q	SUNGARD DATA SYS INC	20	14	15	-2.3	-13.0
Q	SYSTEMATICS INC	34	25	30.5	-0.1	-0.4
N	SYS. SOFT INC.	21	8	20.25	1.8	9.5
Q	VM SOFTWARE INC	18	7	17.125	0.0	0.0
Semiconductors						
N	ADV MICRO DEVICES INC	17	7	8.75	0.1	1.4
N	ANALOG DEVICES INC	16	10	11.75	-0.6	-5.1
Q	ANALOGIC CORP	10	6	9.125	-0.3	-2.7
Q	CHIPS & TECHNOLOGIES INC	21	11	15.25	0.3	1.7
Q	INTEL CORP	37	19	24.75	0.8	3.1
Q	LSI LOGIC CORP	14	7	10.75	0.0	0.0
Q	MICRON TECHNOLOGY INC	26	12	16.25	1.0	6.6
N	MOTOROLA INC	55	36	43.75	1.8	4.2
N	NATL SEMICONDUCTOR	15	8	8.75	-0.1	-1.4
N	TEXAS INSTRS INC	57	35	42.875	1.0	2.4
A	WESTERN DIGITAL CORP	18	11	13.75	0.5	3.8
Peripherals						
Q	ALLOY COMP	5	2	2.25	-0.1	-5.3
N	AM INTL INC	9	3	5.625	0.6	12.5
Q	AST RESH INC	17	7	7.875	0.1	1.6
Q	AUTO TROL TECH CORP	6	3	4.625	-0.1	-2.6
Q	BANCTEC INC	12	6	11	0.5	4.8
Q	CIPHER DATA PRODS INC	11	7	10.25	0.4	3.8
A	COGNITRONICS CORP	4	2	3	0.6	23.1
Q	CONNOR PERIPHERALS	10	7	8.375	0.0	0.0
A	DATAPRODUCTS CORP	15	8	14.25	0.6	4.6
A	DATARAM CORP	9	6	7.625	0.1	1.7
N	EASTMAN KODAK CO	50	39	47.125	1.0	2.2
Q	E M C CORP MASS	19	4	5	0.1	2.6
Q	EMULEX CORP	12	5	11	0.0	0.0
Q	EVANS & SUTHERLAND	23	13	15.75	-0.5	-3.1
Q	ICOT CORP	5	2	2.5	0.0	0.0
Q	INTERLEAF INC	21	6	7.625	-1.1	-12.9
Q	IOMEGA CORP	5	2	2.875	-0.6	-17.9
Q	LEE DATA CORP	4	3	2.938	0.2	6.8
Q	MASSTOR SYS CORP	4	2	3.188	-0.1	-1.9
Q	MAXTOR CORP	16	6	8.25	-0.1	-1.5
Q	MICROPOLIS CORP	30	6	6.625	-0.8	-10.2
Q	MINISCRIBE CORP	14	6	6.5	-0.9	-11.9
N	MINNESOTA MING & MFG CO	67	55	65.75	4.0	6.5
Q	PERSONAL COMPUTER PRODUCTS INC	7	5	4.688	-0.1	-1.3
Q	PRIAM CORP	3	1	1.188	0.1	11.8
Q	PRINTRONIX INC	11	8	7.75	-0.3	-3.1
Q	QMS INC	12	6	8.875	0.6	7.6
Q	QUANTUM CORP	15	10	14	0.0	0.0
N	RECOGNITION EQUIP INC	12	6	11.375	-0.4	-3.2
Q	REXON INC	9	4	6.5	-0.1	-1.9
Q	SEAGATE TECHNOLOGY	23	7	10.625	1.3	13.3
N	STORAGE TECH CORP	4	1	1.75	0.0	0.0
Q	TANDON CORP	3	1	0.938	-0.1	-11.8
A	TEC INC	6	2	3.063	-0.1	-2.0
N	TEKTRONIX INC	30	19	21.875	-0.1	-0.6
Q	TELEVIDEO SYS INC	5	0	0.438	0.1	39.9
N	XEROX CORP	63	50	60.75	1.8	3.0
Leasing Companies						
Q	AMPLICON INC	19	10	18.625	-0.1	-0.7
N	CAPITAL ASSOCIATES INTERNATIONAL INC	7	4	6.625	0.4	6.0
N	COMDISCO INC	25	18	22.125	0.0	0.0
Q	CONTINENTAL INFO SYS	9	0	0.813	0.1	18.2
Q	LDI CORPORATION	14	10	12.75	0.0	0.0
Q	PHOENIX AMERN INC	4	3	3.375	0.0	0.0
Q	SELECTERM INC	6	4	5.75	0.5	9.5

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL

Streetwise

Computer industry toughens up, shows a little spunk on the Street

It may be too early to tell if high-tech is actually returning to favor among investors or if last week's surge in computer stocks was merely a result of rally riders seeking underpriced issues.

But the computer industry was an honored guest as the stock market bulls held a week-long celebration.

Digital Equipment Corp., a market laggard for months, was an investors' darling for the second straight week. DEC closed Thursday at 114¾, up 7⅜ points for the week and a whopping 15⅛ points in the previous six trading sessions. IBM tacked on 2⅜ points to close at 126.

New 52-week highs were all over the industry: Computer Associates International, Inc., increasing 1⅝ points for the week to 30⅞; Compaq Computer Corp., jumping 5 points to 69⅜; 3Com Corp., inching up 1⅝ points to 24⅝; Oracle Corp., creeping up 1½ to 23⅞; and Sequent Computer Systems, Inc., moving up 3⅜ to 23.

On the downside, Unisys Corp. dropped off ¼ of a point to 29 and Data General Corp. also slipped ⅛ of a point to close Thursday at 17⅞.

CLINTON WILDER

Visa

FROM PAGE 1

Visanet also processed another 13,000 changes that ran the gamut from hardware upgrades to software changes for clients.

Just to keep things really interesting, the operations staff tiptoed around a three-month move into a new, $13 million data center that was three years in the making — without creating a single disruption in customer service, said Neil Waldo, senior vice-president of Visanet operations.

Meanwhile, an 18-month effort to convert what was once a bisynchronous network into an IBM Systems Network Architecture network was also put to bed in 1988. "We also successfully converted 70% of our traffic to a new [Open Systems Interconnect] format to aid risk-control procedures," Visa spokesman Dan Brigham said.

ROBERT HOLMGREN

Waldo *deals with 'logistical nightmare'*

Obviously, the freeze is something of an aberration in that it involves just one small piece of Visanet's domain. The Visanet staff operates at a manic pace year-round in an effort to keep on top of a plethora of projects and the constantly changing needs of its clients. This swirl of activity underscores Visa's byword — change, and lots of it.

Visa's corporate goal is to become the leading consumer payment method in the world. Currently, Visa holds 60% of the market share for bank cards. To do this, it must move consumers away from checks and cash. Currently, cash and checks make up 90% of consumer payments, followed by Visa with a 3% to 5% market share, Brigham said. With volume growth in excess of 25% a year, Visanet worldwide must be prepared to handle the increased business.

"Visa is programmed for change; that's our whole emphasis," Massey explained. A close look at the constantly evolving network reveals more than 3.5 million reasons behind Visanet's zest for adventure.

It is not easy keeping tabs on a network that collects data from 850,000 point-of-sale terminals while servicing more than 17,500 banks representing some 2.7 million merchants. Another 90 large merchants with electronic cash register systems maintain 250 direct connections to Visanet. Each access point to Visanet serves as a conduit for authorization requests and data capture activities.

The network's sheer size necessitates nine months of sweat, detente and intricate planning on multiple levels to reach a freezable state. Only then does Visanet get a chance to catch its breath. "When the peak season coordinator decided to get married last year, she waited for the freeze to have her wedding," Waldo said.

As of two weeks ago, the fun began all over again in preparation for the 1989 freeze. "It's a challenge — no, it's a logistical nightmare," Waldo conceded.

For starters, planning exercises alone for customer end points and internal Visanet upgrades gobble up almost four months. It takes another seven months to implement the resulting changes. But a well-stocked larder provides ample fodder for this arduous trek.

In fact, the battle for bucks is a heck of a lot easier at Visa, where a whopping 50% of the corporate budget — in excess of $100 million annually — is devoted to data processing and its staff of 274. That budget "connotes that DP is absolute," said Morgan Whitener, director of switching and authorization.

But just like those annual credit-card offers to delay holiday billing, this cushion of cash does not come without strings. With big money comes big responsibility. Visanet's operations staff must not only grapple with establishing its own priorities for the coming year, but it also takes an active role in business planning, site assessment and equipment procurement for any domestic customer requiring it.

Those customers are made up mostly of the 90 merchants and 140 member-processing companies or third parties that provide transaction processing for banks issuing Visa cards. If necessary, these planning services are extended to any of those 17,500 banks.

Using a compartmentalized approach, logistics is a little more cut-and-dried. The capacity planning process just now getting under way concludes April 1. The process involves about four people who handle coordination and scheduling activities, which ties up a similar number of personal computers for 12 to 16 hours daily for three months.

A peak-season coordinator works with the network engineering department to review weekly transaction volume for the system as a whole and for each end point.

Based on this data, letters were sent out this month to clients making corresponding recommendations for changes at each end point and its system connection point. "We talk to our customers and tell them what volume we saw from them on an individual basis," Waldo said.

Determining size

Waldo's staff consolidates this information and looks at its own capacity requirements, both as a nationwide network and as an end-point device for a particular client. "It's very important that we know what new business ventures they are getting into because it directly impacts our own network," Massey noted. All this data is massaged to determine Visanet's data center host capacity.

"We measure the volume of messages per second so we can be sure we have the right size processor and [direct access storage device] to support those volumes," Massey said. Last year, this process resulted in upgrades of two IBM 3090 Model 150s to 3091 Model 180Es.

Based on internal system changes and end-user projections, Visanet begins negotiations with the customer for the following year. The credit-card issuer both leases processors and connecting equipment and charges an access fee.

"We go back with transaction records and say, 'Based on your input, we should take you from 9.6[K bit/sec. data line] to 19.2, put in a different modem, add more PCs or Series/1s and, in our case, we'll go from a Series/1 to a bigger processor,' " Waldo explained.

Once a configuration has been agreed on, Visanet's planning and implementation team has to design the network to support the changes and order the equipment as well as install and test it for the customer. Some activities such as telecommunications orders require a 90-day lead time. "We spend from April to November installing all this stuff," Massey said.

To keep on top of all this activity, Waldo's staff holds biweekly meetings to update projects. "So that when dates slip, which impacts other items, we're in a position to energize people to go out and correct the problem," Massey said.

Taking inventory

- Visa's real-time authorization system grows at an annual compound rate of more than 30%.
- There are 274 employees staffing Visanet operations; turnover is less than 10%.
- The number of real-time systems includes 140 member-processing companies doing the work for roughly 17,500 banks; 90 merchants at more than 250 sites are linked directly into Visanet.
- The number of transaction/min. peaked at 10,000 in 1988.
- The number of messages per second peaked at 350 in 1988.
- The network hit a $1 billion day for the first time in history on Dec. 13, 1988.
- Transactions increased more than 30% during the period between Thanksgiving and Dec. 14 during the same period in 1987.
- Holiday peak activity typically becomes the system norm by the following August.
- Visanet has two data centers, including a new, $13 million facility in San Mateo, Calif., which houses six mainframes; and a backup site in McLean, Va., which has three mainframes.

High spirits; low turnover

Sanity, not to mention staff, is easily endangered in a fast-paced environment such as the one that exists at Visa U.S.A.'s Visanet, but the credit card company's MIS department manages to nurture both. It does so by combining personnel with the right temperament, an innovative incentive program and the time-honored management maxim of breaking large tasks into several smaller ones.

Given Visa's corporate mandate, "We have to make sure that people understand why we need Operations to be a catalyst and not an inhibitor," said Michael Massey, vice-president of Operations Center West. Consequently, Massey and Neil Waldo, senior vice-president of Visanet operations, and their respective data center and operations staffs are organized to accommodate change.

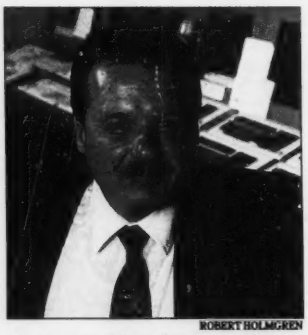
One way to program for change is to hire people who are not looking to do the same thing from one day to the next. For example, despite a full slate of duties, operations staffers also managed to find time to concoct various marketing programs that directly affect their jobs. During the 1988 holiday season, Visa initiated a special promotion called Our Treat. The idea came from Operations and involved Visa randomly selecting transactions in order to pick up the tab for a particular purchase for some lucky consumers.

A second approach to accommodating change involves having the operations staff specialize by service offering. The approach provides consistency, according to Massey.

Also, Visanet computer operators and technicians are on an incentive plan designed to make them really feel accountable for Visanet service and quality. "I've not heard of [another company] where operators themselves are given incentives; that usually stops at the manager level," said Morgan Whitener, director of switching and authorization. "This really builds team spirit."

It must — despite the hectic pace, turnover is less than 10%.

PATRICIA KEEFE



ROBERT HOLMGREN

Massey *sees Operations as catalyst*

OS/2 on the way for EISA, MCA

BY DOUGLAS BARNEY
CW STAFF

REDMOND, Wash. — In about a year, OS/2 will fully exploit the multiple processor capabilities of IBM's Personal System/2 bus architecture as well as the rest of the industry's still unshipped Extended Industry Standard Architecture (EISA), Microsoft Corp. officials said.

A single version of OS/2, a product codeveloped by IBM and Microsoft, will be able to support multiple processing on both the EISA and Micro Channel Architecture (MCA) buses, according to Adrian King, Microsoft's director of operating systems.

The upgrade to OS/2 should be welcomed by IBM PS/2 users waiting to exploit their systems. Until now, the difference between the IBM Personal Computer AT bus style of coprocessing and that of the MCA had been mainly one of potential — the AT bus coprocesses in a serial fashion, while the EISA and MCA can provide multitasking on the bus, explained Mark Mackaman, OS/2 product manager at Microsoft.

IBM's MCA has a clear lead in the race to offer multiple processing. Devices already exploit the so-called bus-mastering or multiple processing features of MCA (see story page 1). But these devices are relatively simple, and they do not provide the more sophisticated capabilities that will arrive when the operating system is more fully married to these advanced buses.

Tapping the PS/2

IBM is already positioning the PS/2 for this new style of computing. Advertisements currently tout the PS/2's largely untapped ability to "put multiple processors on your system, running independently, yet still be able to share important things like memory, disk storage and communications."

For simple coprocessing cards such as disk drive controllers and networking cards, the IBM ad is true. But for yet-to-be-seen specialized devices that will sort databases, manage file systems or provide highly sophisticated graphics processing, systems software support is mandatory, King said.

OS/2 multiple-processing support, due in about a year, will be aimed at specialized processors, King said. Soon after, he claimed, support for systems that contain multiple Intel Corp. 80286 or 80386 processors will be available. These systems will allocate tasks or processes between identical processors.

The earliest multiprocessing support should arrive at nearly the same time that a 386 version of OS/2 hits the market. This version will have a nearly identical file system, interprocess communications capability, graphics engine and program-loading features to today's OS/2. A tool kit for this version reportedly will ship in the first half of this year, with a full version to follow.

Also in the works is a networked version of Dynamic Data Exchange, a protocol for transferring live data between applications that first debuted with Microsoft Windows. With a networked version, multiple machines on a network could receive the same live data updates simultaneously, a useful feature for inventory and stock market quote systems.

Boards

FROM PAGE 1

heels of a renewed effort by Compaq to "clarify misconceptions" about the bus. Compaq's Vice-President of Marketing and Sales Mike Swavely gave *Computerworld* the names of three vendors to disprove the notion that add-in hardware support does not exist. However, one of the three vendors, National Instruments Co. in Austin, Texas, said it had no development plans for the EISA bus. "When we see a market need for EISA boards, we will respond quickly," said Richard House, product manager at National Instruments. "We have not seen that need."

An Interlan, Inc. spokesman said the firm has placed "moderate" resources toward an EISA-compatible product, adding that it develops for "every bus imaginable."

The third vendor, Standard Microsystems Corp. in Hauppauge, N.Y., said it intends to support EISA, but a spokesman called it "a gamble." Also, a survey of add-in board makers found few with concrete development plans for boards that take advantage of EISA's bus-mastering and 32-bit data paths.

"We have not made a decision yet or started any development plans, but we'll support all buses," said Geoff Karlin, Standard Microsystems' director of marketing for system products.

Aside from AST Research, the other add-in hardware developers said they had not even seriously discussed developing for EISA. This may pose a problem for EISA, as IBM's Personal System/2s will have 650 MCA-compatible cards available in the next 90 days, an IBM spokeswoman said. Another 1,750 MCA add-in hardware products are in development, according to IBM.

In contrast, Intel Corp. will start initial component deliveries to be used in building EISA machines at about the same time that Micro Channel bus-mastering cards ship commercially.

Bad timing

According to some add-in hardware vendors, the EISA consortium's timing could not have been worse, as most board vendors are still reeling from the loss of business they accrued during the dynamic random-access memory shortage.

"If IBM says the Micro Channel is the path to the future, then they can make board makers follow," said David Hunter, vice-president of engineering at Ideassociates, Inc. in Billerica, Mass. "But as far as EISA goes, we're not even going to start development plans until we see that there is any kind of market."

"We don't have any confidence in EISA because it offers no additional performance over the Micro Channel," said Marty Alpert, president of Cumulus Corp.

Cincom releases Supra for SQL applications

BY STANLEY GIBSON
CW STAFF

Cincom Systems, Inc., moving to broaden its customer base beyond its traditional mainframe accounts, last week released Version 2 of Supra, its relational database management system for IBM, Digital Equipment Corp. and Unix platforms. Unlike its predecessor, Version 2 is built around SQL.

That change will mean that Version 1 users who intend to move to Version 2 will have to rewrite their applications using SQL syntax, according to Tom McLean, vice-president of marketing and product planning at the company. However, he said, Cincom is offering tools for that purpose.

"We'll maintain Version 1 for some time. There will be future releases of Version 1," McLean said. He said the firm promises a Version 1 that will run above the 16M-byte line under IBM's MVS/XA as well as other performance improvements.

Still on first

One Supra Version 1 user who asked not to be named said he has no intention of moving to Version 2 because he is still in the process of implementing Version 1. The customer welcomed the news of continued support for Version 1, which has an installed base of 500 users, according to a Cincom spokesman.

McLean also assured users that Cincom's Total DBMS product will continue to be supported as before. However, Cincom is also offering a set of utilities that will help Total users migrate to Supra Version 2.

Version 2 was also designed as a building block for a fully distributed relational database of the future, according to Cincom. Version 2 currently executes in a client/server environment, the vendor said.

"They are trying to go into accounts where they don't have to compete with DB2," said Colin White, an independent consultant in San Jose, Calif. The hugely successful IBM DB2 has hit Cincom hard, as it has other independent DBMS vendors, he added.

Fibronics to announce FDDI-to-IBM link

BY PATRICIA KEEFE
CW STAFF

HYANNIS, Mass. — The first Fiber Distributed Data Interface (FDDI) connection for IBM mainframes will be unveiled next week at Communication Networks '89 by Fibronics International, Inc.

Fibronics, a manufacturer of FDDI network products, said it will release the FX8222, a high-speed networking device based on the emerging FDDI standard.

The new product will reportedly allow an IBM host — 370, 4300 or 3000 family — to be channel-attached to a 100M bit/sec. FDDI backbone.

It will also support any system with a standard IBM block-multiplexer channel. Included in this catagory are mainframes from Amdahl Corp., Siemens AG, Fujitsu America, Inc. and Hitachi America Ltd.

IBM is not expected to ship any FDDI products this year, although analysts said the computer giant is looking at utilizing fiber optics for mainframe channel connections (see story page 40).

Available within 60 days of ordering, this latest addition to Fibronics' System Finex FDDI line is based on Advanced Micro Devices, Inc.'s Supernet very large-scale integration FDDI chip set and costs $35,500. The FX8222 also comes with an optical bypass switch for $38,400.

High-speed connections

Fibronics' connection will provide a high-speed interface betwen an IBM mainframe and an FDDI network. The connection reportedly enables the attached system to communicate with other FX8222-attached systems.

It also provides host access for Ethernet networks that are linked via an FDDI bridge, the vendor said.

For example, when used in conjunction with KNET, Fibronics' Transmission Control Protocol/Internet Protocol (TCP/IP) software, the FX8222 provides mainframe file and applications access for all TCP/IP users over an FDDI backbone.

Second-class postage paid at Framingham, Mass., and additional mailing offices.
Computerworld (ISSN 0010-4841) is published weekly, with a single combined issue for the last week in December and the first week in January of 1989 by CW Publishing/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.
Copyright 1988 by CW Publishing/Inc. All rights reserved.
Computerworld can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed: back issues, if available, may be purchased at $2.00 per issue, plus postage. Call (800) 669-1002.
Photocopy rights: permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CW Publishing/Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, MA 01970.
Reprints (minimum 100 copies) and permission to reprint may be purchased from Sharon Bryant, CW Publishing/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.
Subscriptions call toll free (800) 669-1002.
Requests for missing issues will be honored only if received within 60 days of issue date.
Subscription rates: $2.00 a copy: U.S. — $48 a year; Canada — $110 a year; Central & So. America — $130 (surface), $250.00 (airmail) a year; Europe — $195 a year; all other countries — $295 a year. Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

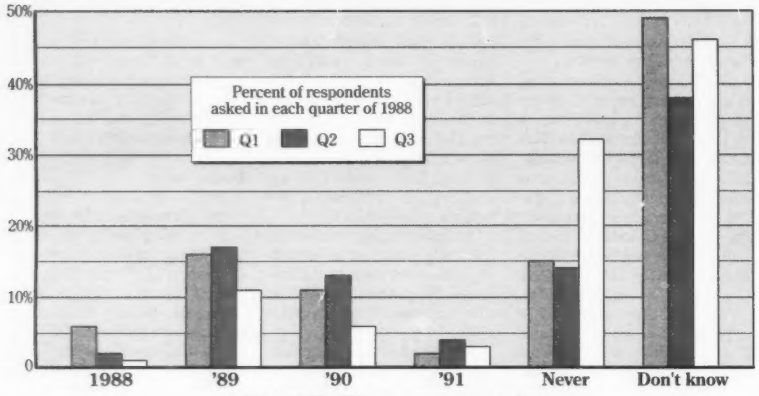
ABP

POSTMASTER: Send Form 3579 (Change of Address) to *Computerworld*, P.O. Box 2044, Marion, OH 43305.

TRENDS

OS/2

Users pushing back, scrapping plans to standardize on OS/2



When OS/2 will become corporate standard

Because users are skeptical of new technologies, plans to implement bold new products are usually scant. As customers learn more about these technologies, plans to implement generally rise.

The exact opposite happened with Microsoft Corp.'s OS/2 operating system, said a report from Framingham, Mass.-based International Data Corp. Users, still flush with excitement from the OS/2 announcement in April 1987, were optimistic. Based on a survey in May 1988, 48.6% of the users said OS/2 would be their corporations' personal computer operating system standard by 1993. By August 1988, that number had been cut in half, with only 22.3% planning to standardize by 1993.

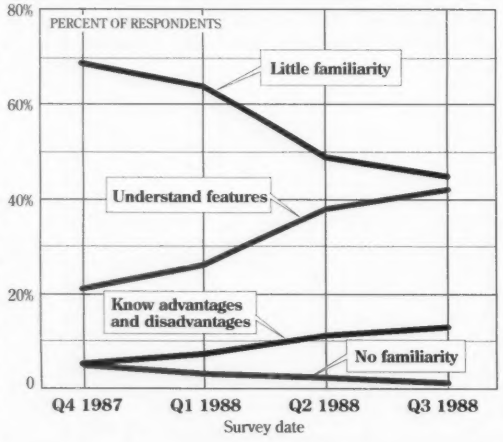
According to the report, as users moved closer to deciding upon OS/2 implementation, they either postponed the decision or simply decided to give up. In fact, the number of firms that plan never to implement OS/2 rose a whopping 135% in that same three-month period.

At the same time, user understanding of OS/2 gained steadily. Scaring away users is the large investment in hardware and software that must be made to run OS/2. OS/2 requires at least an Intel Corp. 80286 microprocessor with several megabytes of random-access memory and a 20M-byte hard disk drive.

Microsoft said the key reason for sluggish OS/2 implementation has been a shortage of applications. Although some 200 OS/2 applications are shipping, many promised applications have yet to arrive.

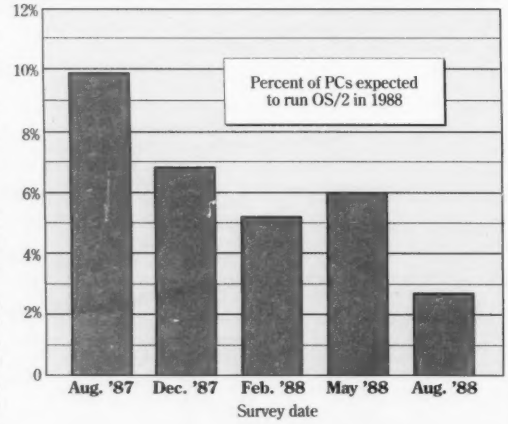
DOUGLAS BARNEY

Familiarity with the system steadily rises



Survey date

Expectations for '88 took nosedive



Survey date

SOURCE: INTERNATIONAL DATA CORP.
CW CHART: JOHN YORK

INSIDE LINES

CIO for State. Secretary of State James Baker is expected to pick Ivan Selin, chairman of American Management Systems, as undersecretary for management at the State Department. Once confirmed by the Senate, Selin would oversee all administrative operations — including the MIS department — for the agency's 23,000 employees around the world. Selin was a management expert at the Pentagon from 1965 to 1970 before leaving to start AMS, a computer software and services firm based in Arlington, Va. AMS has close ties with the Bush administration; the firm worked for White House Chief of Staff John Sununu when he was New Hampshire's governor and then helped out the 1989 Presidential Inaugural Committee.

Atlas greets the world. While most PC DBMS vendors blabber on about plans for client/server architectures and support of SQL back-end database engines, Microrim reportedly plans to go its own way. On Feb. 13, the $18 million firm will announce Atlas, an R:Base compiler product that promises "enterprisewide" DBMS capabilities. While few details are known, the firm plans to offer the compiler on a variety of host-style platforms and will provide access from a variety of workstations. The firm has no current plans to support the growing array of database servers.

They won't leapfrog IBM in this area. Compaq is still leading the charge against IBM's controversial Micro Channel Architecture. According to company officials, the firm has ceased development of its MCA clone. If the market offered up enough opportunities, it would still take the firm one year to revive the project, said chief Compaq techie and father of the Deskpro 386 Gary Stimac.

Who has the most lawyers? Lotus apparently did things by the book when it named its new hard disk utility Magellan. It searched for previous trademarks, found none, and proceeded. But two companies using the name have already reared their heads. First a software reseller called Magellan Software Corp. popped up. Then software developer Emerald Intelligence, Inc. surfaced with an artificial intelligence package called Magellan. It is likely, however, that Lotus will keep Magellan because both Emerald and Magellan Software failed to register their monikers.

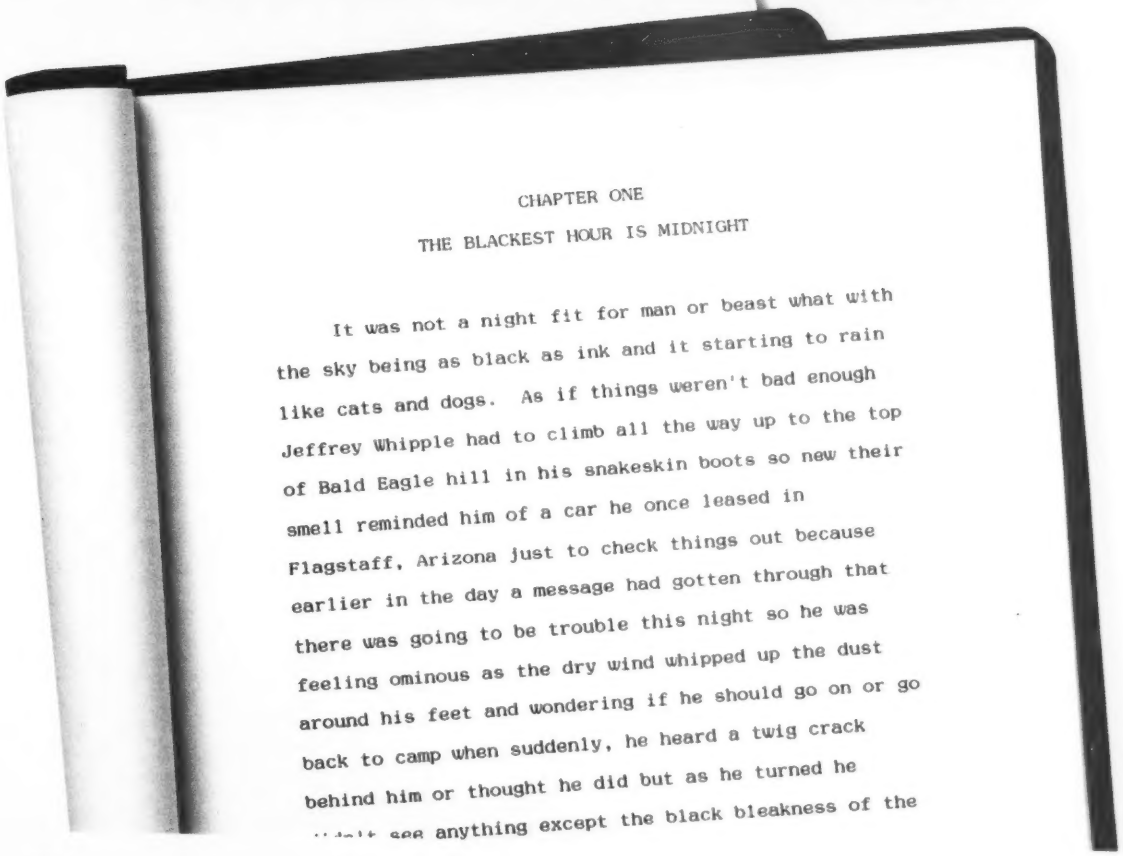
Don't VAX-stop now. Although last week's VAX announcements were based on an improved version of its CVAX microprocessor, sources said DEC may have even more chips up its sleeve. A 7-MIPS follow-on code-named Rigel is in the final design stages and could appear in midrange models by the end of the year, thus fulfilling Vice-President of Mid-Range Systems William R. Demmer's prophecy that DEC will step up its technological turnover. And don't be surprised if DEC rolls out a Microvax line based on the new CVAX chip.

What to do with all that power. DEC is apparently sitting on two major networking announcements. A fiber LAN based on the FDDI standard will definitely show up by year's end, one source said, because Decwindows, the Compound Document Architecture and Image Processing Systems all need the high bandwidth that fiber provides. However, DEC is still arguing with itself whether it will go against "the great Decnet standard" to support IBM's Token-Ring — even though a lot of customers demand it.

Cyclone has yet to hit. Tandem's 100-plus MIPS CPU, code-named Cyclone, was expected to be announced this spring. It will be lucky to hit ground by September. The system reportedly will have greatly expanded I/O, with two or three channels per processor.

We stand corrected — sort of. Apollo called last week after reading our item here about its scheduled workstation announcement. We erred by calling it RISC-based. Seems there is a difference between a RISC workstation and a RISC-based workstation; we asked what the difference is, but they declined to fill us in. We love examining these great marketing strategies, so call in your examples to the hotline, 800-343-6474 or 508-879-0700, and News Editor Pete Bartolik will hold them up to the light of day.

OUR NEW PRINTERS MAKE EVEN BAD WRITING LOOK GOOD.



CHAPTER ONE

THE BLACKEST HOUR IS MIDNIGHT

It was not a night fit for man or beast what with the sky being as black as ink and it starting to rain like cats and dogs. As if things weren't bad enough Jeffrey Whipple had to climb all the way up to the top of Bald Eagle hill in his snakeskin boots so new their smell reminded him of a car he once leased in Flagstaff, Arizona just to check things out because earlier in the day a message had gotten through that there was going to be trouble this night so he was feeling ominous as the dry wind whipped up the dust around his feet and wondering if he should go on or go back to camp when suddenly, he heard a twig crack behind him or thought he did but as he turned he didn't see anything except the black bleakness of the

We're sorry that our new 24-wire Pinwriter® P5200 and P5300 printers can't do much for the quality of your writing. But they can certainly do wonders for the way it looks. The secret is the ribbon. Other dot matrix printers only use a fabric ribbon. Our Pinwriters print with both a fabric and a letter-quality, multi-strike film ribbon—the same kind used on executive typewriters.

The NEC Pinwriters can also enhance your writing in other ways. They have seven resident type styles. Plus four more are available on plug-in font cards. Which means you can express your thoughts with just the right typeface. You can also get an inexpensive, user-installed color option. And if graphics are part of your story, these Pinwriters produce the highest resolution of any printer you can buy.

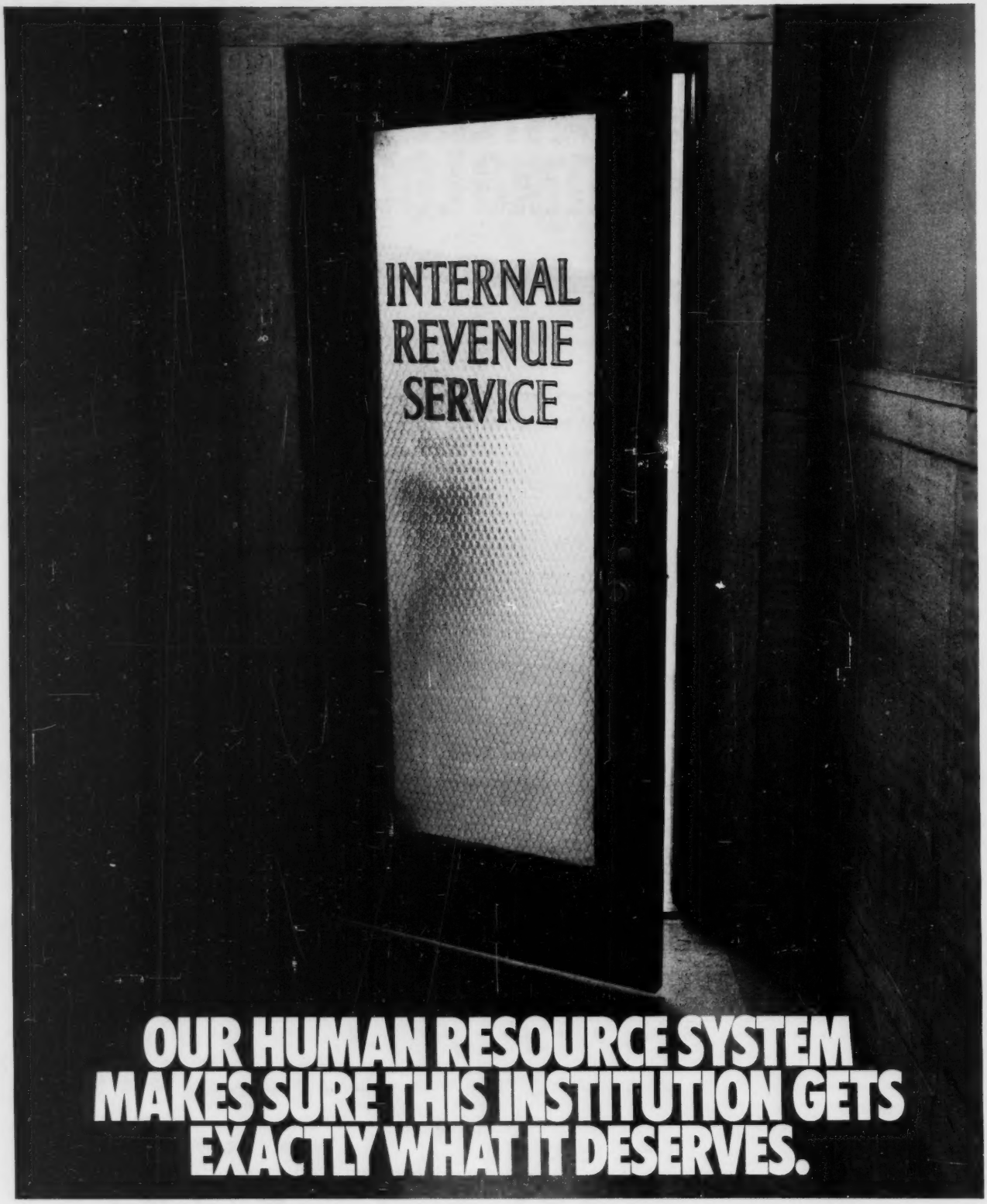
Call NEC Information Systems at 1-800-343-4418 to see how much better our new Pinwriter P5200 and the wider P5300 can make your writing look. Whether you're a budding Hemingway, or a Hemingway & Company.

NEC PRINTERS. THEY ONLY STOP WHEN YOU WANT THEM TO.

NEC

C&C Computers and Communications

NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.



OUR HUMAN RESOURCE SYSTEM MAKES SURE THIS INSTITUTION GETS EXACTLY WHAT IT DESERVES.

On January 1, 1989, when other human resource systems rolled to a halt, ours was rolling into action. Just like the new tax laws.

You see, while Congress was putting new Technical Corrections into effect, we were ready and waiting to apply solutions for section 89 discrimination testing.

That's just one of the reasons why 44% of big business, big enough to have their own packaged mainframe human resource systems, is smart enough to get its software from Management Science America, Inc.

Not only does our system pay accurately, it calculates taxes based on effective dates and produces reports and magnetic tape reporting in state and federal required formats.

Not only is the payroll correct, it is automatically integrated to benefits administration capturing contributions, wage bases, FICA wages and hours on a plan year basis.

Then there's the added dividend of MSA's ongoing maintenance program. Which pays because you'll never have to rewrite your human resource programs to comply with new or adjusted federal regulations.

For more talk about a system that's never taxing, call Robert Carpenter at (404) 239-2000.

MSA
The Software Company

© 1988 Management Science America, Inc.

1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8